9. PERSONAL PROTECTIVE EQUIPMENT

The cold test pit sites pose low to moderate potential hazards to personnel from construction, operation, and maintenance activities. Anyone entering the cold test pits must be protected against these potential hazards. Personal protective equipment requirements relative to project-specific tasks beyond normal cold test pit maintenance activities will be addressed in appendixes to this HASP and will be incorporated as these tasks are identified.

The purpose of PPE will be to shield or isolate personnel from chemical, physical, or biological hazards that cannot be eliminated through engineering or other controls and that may be encountered at the cold test pit sites. It is important to realize that no PPE ensemble can protect against all hazards under all conditions and that work practices and adequate training also will provide a greater level of protection to workers.

Minimum PPE requirements for work in the cold test pits work control zones are as follows:

- Hard hat
- Eye protection (safety glasses with side shields)
- Sturdy leather boots
- Leathers gloves for material handling.

Selection of the proper PPE to protect cold test pit site personnel is based on the following:

- Potential routes of entry
- Physical form and chemical characteristics of simulated waste components
- Acute and chronic effects from exposure to simulated waste components
- Local and systemic toxicity of contaminants
- Anticipated exposure levels (i.e., surface and airborne)
- Hazard evaluation (see Section 8).

The PPE will generally be divided into two broad categories: (1) respiratory protective equipment and (2) personal protective clothing. Both of these categories are incorporated into the standard four levels of protection (i.e., Levels A, B, C, and D) based on the potential severity of cold test pit project hazards. Guidance in the selection process for respiratory and protective clothing is presented in Table 7. cold test pit site-specific hazards and contaminants will be evaluated in determining the most appropriate PPE level and modifications. See the applicable appendix for project-specific information on PPE requirements.

Table 7. Respiratory and protective clothing selection.

Hazard	Level of Protection
Respiratory PPE Selection [a]	
Not immediately dangerous to life or health (IDLH) or oxygen deficient atmospheric conditions. Gaseous, vapor, particulate, and aerosol chemicals and radionuclides.	Level C—full-facepiece, as determined by the industrial hygienist Level B—full-facepiece supplied air respirator with an air-purifying escape cartridge or airhood (bubblehood) High-efficiency particulate air or chemical combination cartridge for concentrations up to the protection factor of an air-purifying full-facepiece respirator
IDLH or oxygen deficient atmospheric conditions. Gaseous, vapor, particulate, and aerosol chemicals and radionuclides.	Level B—full-facepiece, supplied air respirator with an escape-only self-contained breathing apparatus (SCBA) or Level A—SCBA HEPA/chemical combination cartridge for concentrations up to the protection factor of an air-purifying full-facepiece respirator
Protective Clothing Selection	
Low atmospheric contaminant levels that are present under stable conditions. No anticipated immersion, splashes, or potential for unexpected contact with chemicals.	Level D
Moderate atmospheric contaminants under relatively stable conditions, liquid splashes or other direct contact that do not have corrosive characteristics or can be absorbed by exposed skin. Low radionuclide contamination.	Level C

a. If required, a high-efficiency particulate air or multichemical combination cartridge will be selected by industrial hygiene personnel based on specific task hazards.

9.1 Personal Protective Equipment Levels

The following sections provide detail and explanation of the two most likely levels of PPE to be used at the cold test pits. Based on the hazard evaluation and recommendations cited above, the most common level of PPE used at the cold test pits will be Level D. Some potential exists for the requirement to upgrade to a modified Level D or Level C in some site-specific activities. Modifications to these levels will be made under the direction of the HSO in consultation with the project industrial hygienist and safety engineer, as appropriate. Such modifications are routinely employed during HAZWOPER site activities to maximize efficiency and to meet site-specific needs without compromising personnel safety and health.

9.1.1 Level D Personal Protective Equipment

Level D PPE, with potential upgrade to a modified Level D, will serve as the primary PPE for cold test pit activities. Level D PPE affords little protection against chemical hazards and provides no protection against airborne chemical hazards. Level D will be appropriate for use when personnel hazardous chemical exposure is not expected to be above an allowable limit and no danger exists because of absorption of chemicals through the skin. Level D is basically a standard work uniform. This level of PPE at the work site consists of the following:

- Street clothes and coveralls, as required by the industrial hygienist and safety engineer
- Hard hat
- Eye protection (i.e., safety glasses with side shields)
- Approved safety footwear, as specified by the safety engineer.

Optional Level D modifications consist of the following:

- Chemical protective clothing (e.g., Tyvek and Saranex), as prescribed in the task-specific work control documents
- Chemically resistant hand and foot protection (e.g., inner or outer gloves and boot liners)
- Any specialized protective equipment (e.g., hearing protection, cryogenic gloves, face shields, and aprons).

9.1.2 Level C Personal Protective Equipment

For normal cold test pit maintenance and operations, Level C PPE is not expected to be required. Level C PPE may be appropriate for some work at the task site when the contaminants are well characterized, the hazard exposure to personnel by skin absorption is minimal, and the threat is very small that an immediately dangerous-to-life-or-health condition will develop. Personnel working at the work site and wearing Level C PPE will wear the following:

- Level D ensemble with the following upgrades:
- Chemical-resistant coveralls (i.e., Tyvek QC, Tychem 7500, or Saranex-23-P), as prescribed by the industrial hygienist
- Air purifying respirator
    - Chemical-resistant (e.g., rubber and nitrile) outer shoe and boot cover
- Approved safety foot wear, as specified by the safety engineer
- Inner gloves (e.g., rubber and nitrile)
- Outer gloves (e.g., nitrile and rubber)
- Hard hat

- Eye protection (i.e., safety glasses with side shields).
- Optional Level C Modifications:
  - Any specialized protective equipment (i.e., hearing protection, welding lens, and aprons).

9.2 Protective Clothing Upgrading and Downgrading

The cold test pit project HSO in consultation with the project industrial hygienist and safety engineer will be responsible for determining when to upgrade or downgrade PPE requirements. Upgrading or downgrading PPE requirements based on current conditions is a normal occurrence. The action levels listed on Table 5 provide the basis for determining such decisions.

Additional reasons for upgrading or downgrading PPE are listed below.

- Upgrading criteria (work will stop immediately if PPE upgrading is required):
  - Unstable or unpredictable site nonradiological hazards
  - Contaminants that present difficulty in monitoring or detecting
  - Known or suspected presence of skin absorption hazards
  - Temporary loss or failure of any engineering controls
  - Identified source or potential source of a respiratory hazard
  - Change in the task procedure that may result in increased contact with contaminants or meeting any of the criteria listed above.
- Downgrading criteria:
  - New information or monitoring data that shows the contaminant levels to be lower than established action limits
  - Implementation of new engineering or administrative controls that eliminate or significantly mitigate hazards
  - Elimination of potential skin absorption or contact hazards
  - Change in site conditions that results in removal of physical hazards or reduces or isolates them to a controlled area
  - Completion or change in tasks that results in the elimination of key hazards that require higher levels of PPE.

9.3 Inspection of Personal Protective Equipment

All PPE ensemble components must be inspected prior to use and when in use within the cold test pit project work zones. Self-inspection and the use of the buddy system, once PPE is donned, will serve as the principal forms of inspection. If at any time, PPE should become damaged or degraded, the worker

will inform others of the problem and proceed directly to the work zone exit point to doff and replace the unserviceable equipment. In addition, all PPE that becomes grossly contaminated or presents a potential source for the spread of such contamination will require decontamination or replacement. An inspection checklist for common PPE items is provided in Table 8.

Table 8. Personal protection equipment inspection checklist.

Personal Protection Equipment Item	Inspection
Rubber gloves	Before use: • Pressurize gloves to check for pinholes: blow in the glove and then roll until air is trapped and inspect. No air should escape.
Levels D and C	Before use: • Visually inspect for imperfect seams, nonuniform coatings, and tears. Hold the personal protection equipment (PPE) up to the light and inspect for pinholes, deterioration, stiffness, and cracks. While wearing PPE in the work zone: • Check for evidence of chemical attack such as discoloration, swelling, softening and material degradation. Inspect for tears, punctures, and zipper or seam damage. Check all taped areas to ensure that they are still intact.

10. DECONTAMINATION PROCEDURES

No known radionuclides are present at the cold test pits. The chemicals used are a minor hazard and do not pose significant contamination concerns. No decontamination procedures apply to the work in this HASP other than those that would be determined by the project industrial hygienist, should a situation requiring such procedures arise.

See the applicable project-specific appendix for information on required decontamination procedures.

11. EMERGENCY RESPONSE PLAN FOR COLD TEST PIT SITES

This section defines the responsibilities of the cold test pits and the INEEL ERO by providing an emergency response plan for guidance in responding to abnormal events during treatability study activities.

The emergency response plan addresses OSHA emergency response as defined by the HAZWOPER standard (29 CFR 1910.120 and 1926.65); DOE emergencies as defined by DOE Order 151.1A, "Comprehensive Emergency Management System"; and DOE Order 232.1A, "Occurrence Reporting and Processing of Operations Information." The emergency response plan will be implemented in concert with "INEEL Emergency Plan/RCRA Contingency Plan" (PLN-114).

The INEEL Emergency Plan may be activated in response to events occurring at cold test pit sites or at the discretion of the emergency coordinator. Once the INEEL Emergency Plan is activated, project personnel will follow the direction and guidance communicated by the emergency coordinator.

Note: *The OSHA does not define "emergency" the same as DOE. For simplicity, the term "emergency" is used in this section of the HASP to refer to events covered by either the OSHA or the DOE definition.*

This section provides the following emergency response instructions for cold test pit task-site personnel:

- Emergency warning signals and evacuation routes
- Personnel accountability procedures
- Emergency medical services and fire, rescue, and HAZMAT emergency response
- Task-site emergency communications
- Emergency equipment and supplies located at the task site
- Notification procedures for emergency response to the task site.

The cold test pit work tasks do not produce risks that could reasonably be expected to cause an emergency evacuation. Task-site personnel could be affected by an emergency event at an INEEL facility, such as the nearby RWMC.

All emergencies will be reported through the RWMC shift supervisor or the facility manager to ERO personnel for classification in accordance with Section 4 of the "INEEL Emergency Plan/RCRA Contingency Plan," Addendum 3 (PLN-114). If a facility ERO is activated, task-site emergency response will follow the "INEEL Emergency Plan/RCRA Contingency Plan," Addendum 3 (PLN-114).

Response to and mitigation of task-site emergencies will require the expertise of both task-site personnel and INEEL emergency response personnel. Examples of emergencies that could occur include the following:

- Accidents resulting in injury
- Accidents resulting in chemical exposure of personnel

- Fires
- Explosions
- Spills of hazardous materials
- Tornadoes, earthquakes, and other adverse natural phenomena
- Vehicle or transportation emergencies
- Emergencies at nearby facilities or wildfires that could prompt evacuation or take-cover actions at the task site.

11.1 Types of Emergency Events

Note: *This HASP addresses three types of emergency events, as described in the following sections. Each event type may require a different response action by project personnel, but all events will be reported to the RWMC shift supervisor.*

11.1.1 Events Requiring Emergency Notifications But No Evacuation

Certain events require courtesy notifications but do not require a response from the INEEL ERO. In these cases, the field team leader, subcontract technical representative, or designee will immediately notify personnel identified in Section 11.5 of this HASP (the RWMC shift supervisor, the Warning Communications Center [WCC], INEEL subcontractor project and department personnel including the WAG 7 manager of projects who will notify DOE) and other appropriate parties as listed in Section 11.8. The notification should describe the event and state that no emergency response support is required. Examples of these types of events include, but are not limited to, the following:

- Personal injury at the site that requires medical evaluation or treatment but does not require an ambulance response
- Personnel contamination or suspected uptake of a hazardous substance not requiring emergency medical treatment
- Equipment or vehicle accident that results in damage to the vehicle or property ONLY
- A small fire that can be controlled with a hand-held fire extinguisher (all fires must be reported to the INEEL fire department)
- Any spill as defined by MCP-3480, "Environmental Instructions for Facilities, Materials and Equipment"
- Any other event deemed potentially reportable.

11.1.2 Events Requiring cold test pit Evacuation or Emergency Response Organization Response

Some events that could occur at the project or the RWMC may require support from the RWMC ERO or may require a local area evacuation of the project. In these cases, the project field team leader,

subcontract technical representative, or designee, who is the appointed project area warden, will immediately notify the RWMC shift supervisor, the WCC, cold test pit subcontractors, the WAG 7 manager of projects (who will notify DOE), and other appropriate parties as listed in Section 11.8. The notification will describe the event and request emergency response resources, as appropriate. After being informed of the event, the emergency coordinator may elect to activate the RWMC command post. Once the command post is declared operational, all emergency response activities will be coordinated through the emergency coordinator. The specific actions to be taken in response to emergency alarms are described in Section 11.5. Examples of these types of events include, but are not limited to, those listed below:

- A fire that is burning beyond an incipient stage and requires a response from the INEEL Fire Department to mitigate
- A large spill at the project that cannot be immediately contained or controlled
- A serious injury or rescue of a worker or workers.

11.1.3 Events Requiring Radioactive Waste Management Complex and cold test pit Evacuation

No credible scenarios could or would result in the total evacuation of the RWMC from a cold test pit emergency event. In the event that an RWMC emergency requires evacuation of the cold test pits, the field team leader, subcontract technical representative, or designee will be notified by the ERO to evacuate all cold test pit personnel. The RWMC emergency coordinator will be responsible for ordering a total area evacuation protective action that may include the cold test pit areas.

Note: *When an evacuation is called for by the emergency coordinator, the field team leader or subcontract technical representative will be the designated project area warden who will ensure that the ERO personnel accountability leader has been notified that all cold test pit workers have been evacuated and personnel accountability has been completed.*

11.2 Emergency Facilities and Equipment

Emergency response equipment that is maintained at the cold test pits includes the items described in Table 9. Addendum 3 to the INEEL Emergency Plan lists emergency equipment available at the RWMC. This includes the command post located in Building WMF-637, equipment located in Building WMF-601 (i.e., self-contained breathing apparatus [SCBA] dosimeters, air samplers, decontamination, first-aid equipment), and an emergency response trailer. The INEEL Fire Department maintains an emergency HAZMAT response van that can be used to respond to an event or emergency at the cold test pits. Fire department personnel are also trained to provide immediate HAZMAT spills, rescue, and medical services. At least two people with current medic or first-aid training will be present at the cold test pits during all work activities (except cold test pit area monitoring and surveillance) to render first aid, as required. The cold test pit HSO and industrial hygiene personnel may assist with emergency decontamination efforts. Emergency equipment requirements relative to project-specific tasks beyond normal cold test pit maintenance and operations activities will be addressed in appendixes to this HASP and will be incorporated as these tasks are identified.

Table 9. Emergency response equipment to be maintained at the task site.

Equipment Name and Quantity Required	Location at Task Site	Responsible Person	Frequency of Inspection
Fire extinguishers	Located throughout the Cold Test Pit areas and on all fueled equipment	Health and safety officer (HSO)	Monthly
First-aid kit	Administration Area	HSO	Monthly
Eyewash bottles[a]	Administration Area	HSO	Monthly
Eyewash station[a]	Administration Area	HSO	Monthly
Hazardous materials spill kit[b]	Administration Area	HSO	Monthly
Communication equipment available	Onsite	Field team leader	Availability and functional check

a. Eyewash bottles, stored in the administration area, will be used in the control zone, when required, to provide an immediate eye flush. An eyewash station that meets the American National Standards Institute Z 358.1-1990 requirements is available in the administration area and will be moved to the control zone, when required.

b. The spill kit is stored in the administration area and will be moved to the control zone, when required.

11.3 Emergency Communications

In the event of an emergency, the capability to summon INEEL emergency response resources, to immediately notify site personnel, and to inform others of site emergencies is required.

Communications equipment at the task site will be a combination of pagers, radios, and telephones (e.g., mobile, cellular, or land lines).

The following actions, as necessary, will be taken for emergency situations:

- Call 777, the INEEL site emergency telephone number or 526-1515, the WCC. Once the initial call is made, the field team leader, subcontract technical representative, or HSO may use the E-NET radio to update emergency response personnel.
- Notify site personnel to evacuate to the designated marshalling or take-cover area by use of verbal communications, radios, cell phones, or a hand-held air horn with intermittent blasts.
- Notify site personnel to take cover using a continuous blast of the air horn.
- Contact the RWMC shift supervisor or facility manager by radio or telephone.
- The RWMC shift supervisor will contact the RWMC ERO.

Site personnel should provide the following information, as available, when communicating emergency information to the INEEL site emergency telephone number, the WCC, or the point of contact:

- The caller's name, telephone number, radio call sign, and pager number

- Exact location of the emergency
- Nature of the emergency, including time of occurrence, current site conditions, and special hazards in the area
- Injuries, if any, including number of injured, types of injuries, conditions of injured
- Additional information, as requested.

11.4 Emergency Response Roles and Responsibilities

11.4.1 Emergency Response Organizations

The INEEL ERO structure is based on the incident command system. The incident command system is an emergency management system designed for use from the time an incident occurs and will be responded to until it is terminated. The system consists of procedures for controlling personnel, facilities, equipment, and communications. It allows for activating emergency response resources in a graded approach depending on the nature and seriousness of the event. At the cold test pits, the incident command system is implemented as a chain of command operating on three basic levels: (1) the on-scene commander, (2) the RWMC command post, and (3) the INEEL Emergency Operations Center.

11.4.1.1 On-Scene Commander. The on-scene commander (as specified in PLN-114) has the tactical and command responsibility for the control of an emergency situation at the scene, a fire, HAZMAT response, and as a special rescue response. The senior fire department officer responding for the INEEL Fire Department fills this position. If the event is primarily a security incident, the senior responding protective forces officer will assume the duties of the on-scene commander. In some instances, the incident response team leader may function as the on-scene commander until relieved by a higher-tiered authority. The incident response team leader reports to the on-scene commander who reports to the emergency coordinator. The incident response team acts at the first responder awareness level by providing initial-control personal-protective measures and incident assessment and mitigation, as directed by the incident response team leader.

The project field team leader, subcontract technical representative, and HSO, as well as the designated replacement, will be trained at the first responder awareness level and will:

- Understand the potential outcomes associated with an emergency when hazardous substances are present
- Understand what hazardous substances are and their associated risks in an incident
- Recognize the presence of hazardous substances in an emergency
- Identify the hazardous substances, if possible
- Assume the roles of a first responder at the awareness level
- Realize and understand the need for additional resources.

11.4.1.2 Radioactive Waste Management Complex Command Post. The RWMC command post is the second tier of the emergency response line organization and will be headed by the emergency coordinator. The emergency coordinator will be responsible for all emergency response actions within the

entire facility including advising the on-scene commander. The command post will be activated for actual or potential emergencies or at the direction of the emergency coordinator. If the command post is activated in response to an event at the project, then the project will send a representative to the command post to advise the emergency coordinator.

11.4.1.3 Emergency Operations Center. The Emergency Operations Center is the upper tier of the ERO and is headed by the INEEL emergency director. The emergency director will be responsible for all emergency response actions at the INEEL including advising the emergency coordinator. cold test pit personnel do not normally provide direct support to the Emergency Operations Center.

11.4.2 Project Personnel Involved in Emergencies

11.4.2.1 Field Team Leader and Subcontract Technical Representative. The field team leader, subcontract technical representative, or the HSO will be responsible as the designated project first responder at the awareness level for initiating all requests for emergency services (e.g., fire and medical) and for notifying the facility shift supervisor of abnormal or potential abnormal events occurring on the project. The field team leader, subcontract technical representative, or designee serves as the project area warden. In this capacity, the field team leader or subcontract technical representative will report the accountability for all employees to the personnel accountability leader when an emergency evacuation is called. In addition, the field team leader or subcontract technical representative will control the scene at the first responder awareness level until relieved by a higher-tiered incident command system authority at the scene to take control as the on-scene commander. While maintaining control of the scene from a protected and controlled distance, the field team leader or subcontract technical representative will maintain communication with the facility shift supervisor or the emergency coordinator when the emergency communication system is in place.

11.4.2.2 Project Personnel. Every person at the project has a role to play during an event or INEEL emergency. Each employee must be constantly aware of potential problems or unexpectedly hazardous situations by immediately reporting these situations to the field team leader, subcontract technical representative, or HSO. All employees are expected to watch out for their fellow workers, to report their concerns to the field team leader or subcontract technical representative, and to respond to emergency events as provided for in this HASP. Specific project personnel responsibilities are outlined in Table 10.

11.5 Emergencies, Recognition of Warnings, and Response

11.5.1 Emergency Recognition and Response

All task-site personnel should be constantly alert for signs of potentially hazardous situations, including signs and symptoms of chemical exposures or equipment failure or collapse. All personnel entering the cold test pit areas will be trained on the methods, signals, and alarms used to convey "EVACUATION" and "TAKE COVER" and on the expected responses. Cold test pit personnel will also be trained (during the training for this HASP) on the following immediate response actions:

- Assembling task-site personnel at the designated assembly point of the RWMC for an evacuation of the cold test pits

- Summoning the INEEL emergency response by calling 777 (INEEL site emergency telephone number) or the WCC at 526-1515

Table 10. Responsibilities during an emergency.

Responsible Person	Action assigned
Field team leader or subcontract technical representative	Contact the Radioactive Waste Management Complex shift supervisor or emergency coordinator (if command post has formed) OR
	Contact the INEEL Site Emergency Telephone or Warning Communications Center (if RWMC shift supervisor cannot be contacted)
	Contact Environmental Restoration (ER) point of contact or ER Pager (4904)
	Contact Waste Area Group (WAG) 7 manager of projects
	Act as point of contact
	Conduct accountability and report information to the RWMS shift supervisor or personnel accountability leader
	Contact supervisors of injured personnel
WAG 7 manager of projects	Contact the vice president of Environmental Management
	Contact U.S. Department of Energy Idaho Operations Office ER Program counterpart
Any project worker	Signal evacuation or take-cover for cold test pits project site emergency event
Any extinguisher-trained project worker	Extinguish fires (incipient stage fires only)
Any project worker	Contain spills (within level of training)
Medic first–aid-trained personnel	Provide first aid within level of training
Health and safety officer	Accompany injured personnel to the Occupational Medical Program
Supervisors of injured personnel	Accompany injured personnel to the Occupational Medical Program

- Ensuring medic- or first-aid-trained individuals are available to provide care during accidents resulting in injury and reporting any injury that requires transportation by ambulance to a medical facility by calling 777 or 526-1515

- Ensuring task-site personnel extinguish any incipient fires using hand-held extinguishers and immediately reporting all fires by calling 777 or 526-1515

- Ensuring cold test pit personnel limit exposure to hazardous conditions in cases of hazardous material spills by following and not exceeding the limitations of their training and qualification for HAZWOPER, summoning INEEL emergency response for large spills by calling 777 or 526-1515, and immediately contacting the environmental affairs spill response categorization and notification team for all spills (via Pager No. 6400)

- If spills are small enough to be safely contained at the cold test pits, spill control will be handled by task-site personnel, who will take the following immediate spill-response actions:

- Evacuating and isolating the immediate area
- Seeking help from and warning others in the area
- Stopping the spill, if it can be done without risk (e.g., returning the container to the upright position, closing valve, shutting off power)
- Providing pertinent information to the field team leader, subcontract technical representative, and the HSO
- Securing any ventilation paths and ensuring that the industrial hygienist or safety engineer surveys the area to determine the extent of a chemical spill, as appropriate.

Emergency drills will be conducted relative to project-specific tasks beyond normal cold test pit maintenance and operations activities, and will be addressed in appendixes to this HASP, which will be incorporated as these tasks are identified. The purpose of these drills will be to familiarize employees with their respective emergency response actions. Any radio or telephone communications that are included in drills will be immediately preceded and followed with a statement that "This is a drill" to prevent an actual emergency response from being initiated by WCC. Each drill or actual emergency at the cold test pits will be followed by a critique and any identified deficiencies in the emergency plan will be corrected.

11.5.2 Alarms

Alarms and signals are used at the cold test pits and INEEL to notify personnel of abnormal conditions that require a specific response. Responses to these alarms are addressed in the general employee training. In addition to the alarms previously described, emergency sirens located throughout the RWMC serve as the primary means for signaling emergency TAKE COVER or EVACUATION protective actions. To signal site personnel of a project-initiated emergency event, emergency signals have been established based on using hand-held air or vehicle horns. These signals are described in Table 11.

Table 11. Project internal and backup emergency air-horn signals.

Device or Communication Method	Signal	Associated Response
Air horns (blasts)	One continuous blast.	Take cover.
	Multiple short blasts (until all personnel react and begin evacuation).	Local area evacuation. Leave immediate work area and proceed to project assembly area.
	Three long blasts.	Return to site—all clear.

11.5.2.1 Take Cover. Emergency conditions may require that all personnel take cover in the nearest building. A TAKE COVER protective action may be initiated as part of a broader response to an emergency situation and may precede an evacuation order. The order to TAKE COVER is usually announced by activating a hand-held air horn. The signal to take cover will be a continuous blast that can be heard throughout the cold test pit areas. Remember, **STEADY = STAY** at the cold test pits. But the order to TAKE COVER can also be given by word of mouth, radio, or voice paging system. When ordered to TAKE COVER, project personnel will place the site in a safe condition (as appropriate) and

then seek shelter in the project support or cold test pit administration trailer. Vehicles may be used for shelter if there are no buildings nearby. Eating, drinking, and smoking are not permitted during TAKE COVER conditions.

11.5.2.2 Total Area Evacuation. A total area evacuation is the complete withdrawal of personnel from the project site and the entire RWMC area. The evacuation signal is an ALTERNATING SIREN that can be heard throughout the RWMC. Remember, **ALTERNATE = EVACUATE.** However, the order to evacuate can also be given by word of mouth, radio, or voice paging system. When ordered to EVACUATE, project personnel will place the cold test pit area in a safe condition (as appropriate) and then proceed along the specified evacuation route to the designated assembly area (WMF-637) or as directed by the emergency coordinator.

For total area evacuations, the RWMC command post is activated and all personnel gather at the primary RWMC evacuation assembly area or the location designated by the emergency coordinator. Following a project evacuation, the field team leader or subcontract technical representative will conduct accountability and report the results to the identified RWMC personnel accountability leader or RWMC emergency coordinator.

11.5.2.3 Local Area Evacuation. A local area evacuation will be the complete withdrawal of personnel from a project control zone, but it does not require the complete evacuation of the entire cold test pit areas. The order to evacuate can be given by word of mouth, radio, or voice paging system. When ordered to evacuate the local area, project personnel will place the project site in a safe condition (as appropriate) and then proceed along the specified evacuation route to the assembly area designated for local area evacuations or as directed by the field team leader or subcontract technical representative. Eating, drinking, and smoking are not permitted during emergency evacuations.

11.5.3 Personnel Accountability and Area Warden

Project personnel are required to evacuate the site in response to TAKE COVER and LOCAL AREA EVACUATION alarms. In each case, the project area warden will account for the people present on the site at the time the alarm was initiated. The field team leader, subcontract technical representative, or designee serves as the area warden for the project and completes the personnel accountability based on the sign-in roster used to control site access. As described next, the method used to report the results of the accountability process varies depending on the nature of the emergency event.

For total area evacuations, the RWMC command post will be activated and all personnel will gather at the evacuation assembly area designated by the emergency coordinator. In this situation, the project area warden reports the results of the accountability process to the RWMC personnel accountability leader.

The RWMC command post will also be activated for TAKE COVER alarms; however, personnel remain in the closest appropriate shelter. In this situation, a complete personnel accountability report will not be required, but the cold test pit area warden should report the results of the accountability process to the RWMC command post or shift supervisor.

The RWMC command post is not usually activated for a cold test pit local area evacuation. In this situation, a complete personnel accountability report will not be required, but the project area warden should report the results of the accountability process to the RWMC shift supervisor who will provide the information to the RWMC facility manager.

11.5.4 Notifications

As directed by the office of the Secretary of Energy, the RWMC area director will be responsible for immediately notifying the DOE and local agencies off-Site of all significant abnormal events that occur at the cold test pits. This duty will be in addition to the notification requirements established in INEEL procedures for events that are categorized as emergencies or unusual occurrences. For this reason, the project field team leader or subcontract technical representative will immediately report all abnormal events that occur on the site to the RWMC shift supervisor and to the WCC. The WCC will, in turn, notify the appropriate INEEL emergency response resources and other INEEL facilities. The RWMC shift supervisor and the WCC share the responsibility for notifying the RWMC facility manager, emergency coordinator, and area director, as appropriate. The field team leader or subcontract technical representative may make additional notifications (as listed in Section 11.8) at the discretion of the project supervision.

The emergency coordinator will be the single point of contact between the project and the INEEL ERO and off-Site people or agencies. The emergency coordinator will make all off-Site notifications. The cold test pits notification responsibilities are listed in Table 12.

Table 12. Cold test pit notification responsibilities.

Responsible Person or Organization		Phone	Pager	Radio
Field team leader or any task-site personnel	INEEL emergency response telephone number	777	–	KOK 130
Field team leader or subcontract technical representative	Warning Communications Center	526-1515	–	KID 240
Field team leader or subcontract technical representative	INEEL spill notification team for spills	–	6400	–
Field team leader or subcontract technical representative	RWMC shift supervisor	526-2767	4428	–
Field team leader or subcontract technical representative	WAG 7 manager of projects	526-3029	6451	–
WAG 7 manager of projects	ER manager of projects	–	–	–
WAG 7 manager of projects	DOE-ID manager, ER	–	–	–
WAG 7 manager of projects	ER safety, health, and quality assurance manager	526-9566	5689	–
RWMC shift supervisor	RWMC site area director or landlord	526-4223	5270	–

DOE-ID = U.S. Department of Energy Idaho Operations Office
ER = environmental restoration
INEEL = Idaho National Engineering and Environmental Laboratory
RWMC = Radioactive Waste Management Complex
WAG – waste area group

11.5.5 Evacuation Routes

Primary and secondary evacuation routes are maintained for the cold test pits, as shown in Figure 6. These routes may be used in response to a total cold test pit area evacuation, as directed by the emergency coordinator. Copies of the evacuation routes will be posted at project-specific sites and in the cold test pit general administrative trailers for the cold test pits.

If the cold test pit sites are evacuated, personnel will assemble in the RWMC operations control building or as directed by the field team leader or subcontract technical representative. If a total area evacuation of the RWMC is ordered, then project personnel will relocate to the primary evacuation assembly area at the RWMC or as directed by the emergency coordinator.

11.6 Reentry and Recovery

11.6.1 Reentry

During or following an emergency response, it is sometimes necessary to reenter the scene of the event. Reasons for performing a reentry may include the following:

- Performing personnel search and rescue
- Responding to medic and first-aid needs
- Performing safe shutdown actions
- Addressing mitigating actions
- Evaluating and preparing damage reports
- Performing radiation and HAZMAT surveys.

Reentries will be carefully planned to ensure that personnel are protected from harm and to prevent initiating another emergency event. Reentry planning will be undertaken as a graded approach, depending on the nature of the initiating event.

11.6.2 Recovery

After the initial corrective actions have been taken and effective control established, response efforts will shift toward recovery. Recovery is the process of assessing post-event or emergency conditions and developing a plan for returning to pre-event or pre-emergency conditions, when possible, and following the plan to completion. The emergency coordinator will be responsible for determining when an emergency situation is sufficiently stable enough to terminate the emergency and enter the recovery phase. The RWMC facility manager will appoint the recovery manager.

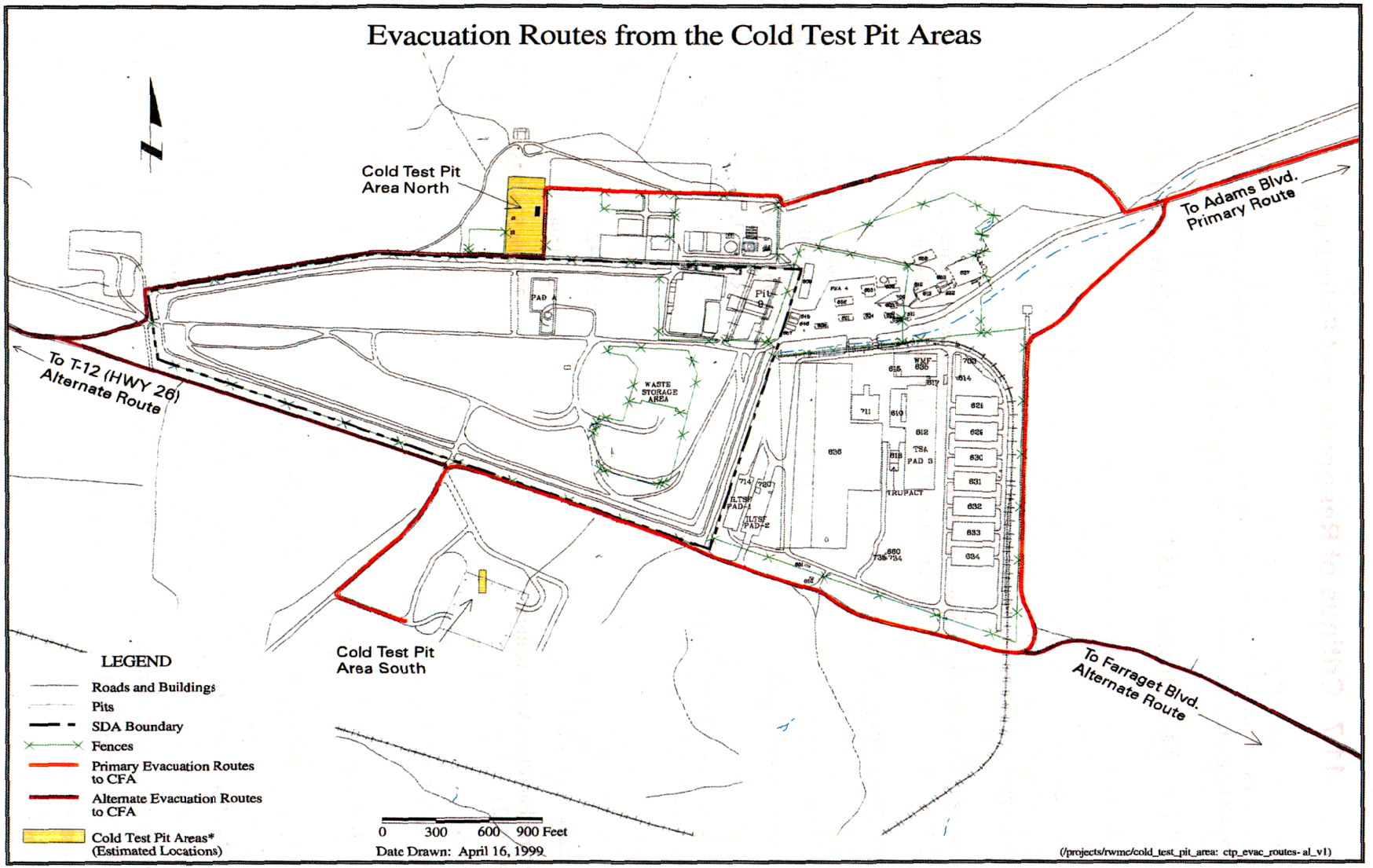

Figure 6. Cold test pit primary and secondary evacuation routes.

11.7 Critique of Response and Follow-up

A review and critique will be conducted following all emergency events, drills, and exercises at the INEEL. In some cases, an investigation may be required prior to commencing recovery actions. For this reason, care should be exercised to preserve evidence, when appropriate.

11.8 Telephone and Radio Contact Reference List

The points of contact for normal operations at the cold test pits are listed in Table 13. Point of contact lists relative to project-specific tasks beyond normal cold test pit maintenance and operations activities will be addressed in appendixes to this HASP, which will be incorporated as these tasks are identified. These lists will be posted at the entrance to the project-specific control zones and in the general administrative and project-specific site offices for the cold test pits.

A map showing the route to the nearest medical facility, locations of nearby INEEL fire stations, site and facility evacuation routes, and evacuation pickup locations is provided in Figure 7.

Table 13. Project emergency point of contact list.

Contact Title	Contact Name	Phone Number or Radio Net	Pager Number
Warning Communications Center	–	777 or 526-1515 Radio: KID-240	–
Radioactive Waste Management Complex (RWMC) shift supervisor	–	526-2767	–
RWMC nuclear facility operations	Albert E. Millhouse	526-6932	5304
RWMC site area director	David M. Bright	526-4223	5270
Operational medical program	–	526-1596	–
First aid (Central Facilities Area medical facility, CFA-1612)	–	777, or 526-2356	–
Fire and security	–	777	–
Waste Area Group (WAG) 7 manager of projects	John M. Schaffer	526-3029	6451
Environmental Restoration (ER) -RWMC liaison	Richard L. Jones	526-3190	7914
ER safety, health, and quality assurance manager	Charles Chebul	526-9566	5689
ER environmental compliance officer	Brent N. Burton	526-8695	7486
RWMC safety engineer	James F. O'Brien	526-5179	6447
RWMC ESH/QA department manager	Randy D. Sayer	526-5706	5865
RWMC radiological control engineer	Thayne C. Butikofer	526-7873	3296
RWMC industrial hygiene	Brian M. Perkes	526-9358	6355
RWMC emergency planner	Gerald L. Gibeault	526-1767	5802

Table 13. (continued).

Contact Title	Contact Name	Phone Number or Radio Net	Pager Number
ER quality engineer	Robert G. Thompson	526-9618	4067
WAG 7 radiological control engineer	W. Rick	526-5318	5898
WAG 7 industrial hygiene	Jonathon D. Roberts	536-5386	3351
WAG 7 safety engineer	Kelly A. Wooley	526-2552	7368
ER cold test pit field team leader	Elden B. Thompson	526-7513	6770

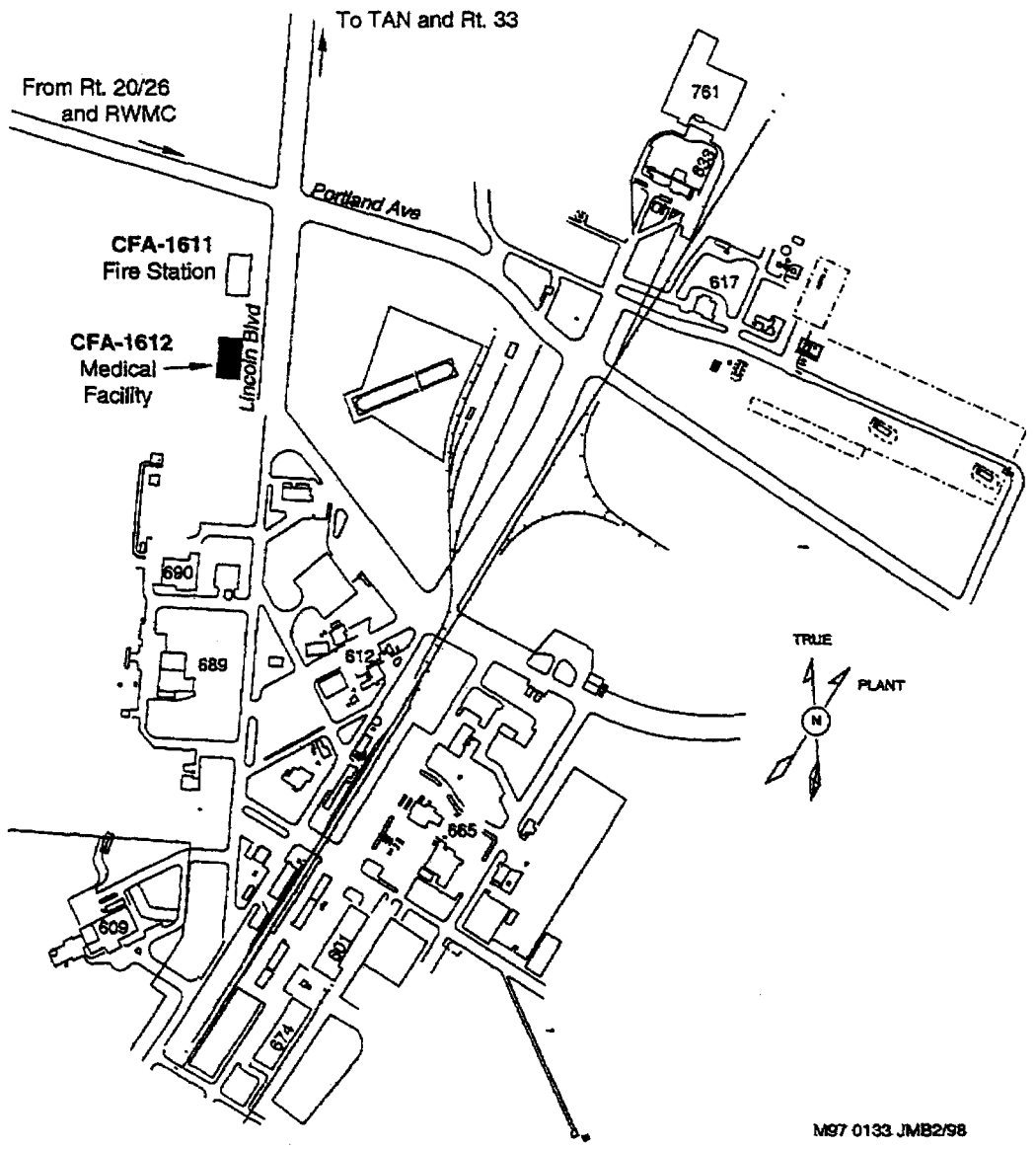

Figure 7. Map showing the route to the nearest medical facility (CFA-1612).

12. REFERENCES

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Appendix A

Innovative Subsurface Stabilization Project
Permeameter Removal Activity
at Cold Test Pit South

Appendix A

Innovative Subsurface Stabilization Project Permeameter Removal at Cold Test Pit South

A-1. INTRODUCTION

In the summer of 1996, personnel working on the innovative subsurface stabilization project (Loomis et al. 1997) at the Idaho National Engineering and Environmental Laboratory (INEEL) constructed three hydraulic conductivity field-scale permeameters oriented in a north-south configuration at Cold Test Pit South. The permeameters are culverts 3 m (10 ft) in diameter and 3.4 m (11 ft) in height with bottoms and lids 20 cm (8 in.) thick placed on reinforced concrete pads 3.7 × 3.7 × 0.3 m (12 × 12 × 1 ft) thick. The northern permeameter was not used or filled and was removed in 1999. The two remaining permeameters were filled with surrogate waste forms. The southern permeameter was filled with high-pressure grout, penetrating the surrogate waste. Hydraulic conductivity tests were completed on both permeameters containing simulated waste.

The two remaining permeameters containing simulated waste require removal from Cold Test Pit South. Cold Test Pit South is located south of the Subsurface Disposal Area (SDA) in the Radioactive Waste Management Complex (RWMC) at the INEEL. Figures 1, 2, and 3 in the main body of this document are maps of the INEEL, the RWMC, and Cold Test Pit South, respectively.

A-1.1 Purpose

This appendix establishes the minimum requirements that will be used to eliminate or minimize health and safety risks to personnel working on innovative subsurface stabilization project permeameter removal at Cold Test Pit South in the RWMC. For information on the applicable requirements included in INEEL manuals and the Occupational Safety and Health Administration (OSHA) standard, "Hazardous Waste Operations and Emergency Response (HAZWOPER)" (29 CFR 1910.120, 1926.65), see Section 1 of the main body of this document.

A-1.3 Scope

This appendix addresses the excavation and removal of the two remaining permeameters at Cold Test Pit South. Heavy equipment will be used to excavate soil to access the permeameters for surrogate waste removal and permeameter unit disassembly. Three options have been developed available to remove and dispose of the waste. In all options, removal of 0.9 m (3 ft) of overburden to allow access to and removal of the permeameter lids will be required. All waste will require characterization and disposal in accordance with appropriate procedures.

Option 1 would involve removal of all simulated waste through the permeameter top culvert opening without further excavation. The permeameter culverts would then be fragmented and removed. The excavated area would be backfilled and the area contoured to match surrounding grade.

Option 2 would involve removal of the top one-third of the simulated waste through the top culvert opening. Further excavation would then be completed and the top culvert ring would be removed. Simulated waste would be removed down to the top of the bottom culvert ring. Excavation and removal of the second ring would be completed. The final simulated waste and culvert ring would be removed in a

manner similar to the first two levels. The excavated area would then be backfilled and contoured as described above.

A third option is to excavate all soil around the permeameter units to fully expose them. The units would then be carefully fragmented to allow gradual access to and removal of the surrogate waste. After permeameter removal and disposal, the area would be backfilled and contoured as described above.

As permeameter removal activities progress, methods other than those described above may be proposed and used for removal and disposal activities. The ultimate scope of the activity will remain the same: the removal and disposal of the permeameters and surrogate waste contained in them.

Supplemental scope for this activity is included to support the following project-related Cold Test Pit South activities:

- Remove the contents from two shallow grout equipment cleanout pits. Contents may be transported to the Central Facilities Area (CFA) landfill for disposal.

- Move or transport material located at Cold Test Pit South to CFA for excess or as directed by the subcontract technical representative or field team leader.

A-1.4 Idaho National Engineering and Environmental Laboratory Site Description

For details on the location and operational history of the INEEL, see Section 1 of the main body of this document.

A-1.5 Site Description

One of two cold test pits in the RWMC, Cold Test Pit South is located south of the SDA. All work described in this appendix will be completed in Cold Test Pit South.

The two remaining innovative subsurface stabilization project field permeameter units are oriented in Cold Test Pit South in a north-south configuration. The edge of the north unit is approximately 4.6 m (15 ft) away from the southeast corner of the large yurt located in the Cold Test Pit South area. The north and south units are approximately 4.6 m (15 ft) apart (see Figure 3 in the main body of this document).

The permeameters are constructed from concrete culverts commonly used for ditch bridge construction. The permeameters, consisting of three rings, a bottom, and a lid, reach 3.4 m (11 ft) in height with an inside diameter of 3 m (10 ft). They are constructed on top of 3.7 × 3.7 × 0.3-m (12 × 12 × 1-ft) rebar reinforced concrete slabs. The lids are fastened to the top of the culverts and have 3-m (10-ft) standpipes extending vertically from them. Each permeameter unit contains 33 nominal 55-gal drums intermingled with soil, with approximately 40% simulated waste and 60% soil. Approximately one-third of the drums are placed at the level of each ring section. Of the estimated 33 drums interred, four were metal and the remaining 29 were cardboard (Loomis et al. 1997). All drums contained polyethylene bag liners. Thirteen of the drums contain combustible materials, 12 of the drums contain sludge material (three with granular sodium and potassium nitrate, four with INEEL soil, and five with vegetable oil and absorbents), and eight of the drums contain metal concrete and asphalt. All of the drums have 200 g (0.44 lb) of insoluble cerium oxide powder added as a simulant for plutonium oxide that is found in SDA waste. Five 0.6 × 0.6 × 0.9-m (2 × 2 × 3-ft) sacks containing simulated combustible waste also were placed in each culvert. The southern permeameter was filled with high-pressure grout, penetrating and

encapsulating the simulated waste. Hydraulic conductivity head testing was conducted on both units by filling them with water to the 3-m (10-ft) standpipe level and measuring outflow at the base of the units over several weeks. After testing, the units were covered with soil to a level 0.9 m (3 ft) above the lids (Loomis et al. 1997).

A-2. KEY SITE PERSONNEL RESPONSIBILITIES

The organizational structure for work at Cold Test Pit South reflects the resources and expertise required to perform the work while minimizing risks to worker health and safety, the environment, and the general public. No site-specific changes in personnel are required to perform the work described in this appendix. The key positions at the site, and the corresponding lines of authority and communications, are shown in the organizational chart in Figure 5 in the main body of this document. Descriptions and responsibilities of the key site personnel are detailed in Section 2 of the main body of this document.

A-3. RECORD-KEEPING REQUIREMENTS

No site-specific changes are required for safety and health record-keeping activities for this appendix. See Section 3 of the main body of this document for the general requirements pertaining to record keeping for this project.

A-4. PERSONNEL TRAINING

Training requirements for work completed in the cold test pits (including Cold Test Pit South) are addressed in Section 4 of the main body of this document. Additional project-specific requirements for the work detailed in this appendix are identified in Section A-4.1 below.

A-4.1 Site-Specific Project Training

At a minimum, all site personnel will receive training, as specified in Table A-1. Before beginning work at the site, site-specific training will be conducted by the field team leader or subcontract technical representative, or health and safety officer (HSO), including a complete review of this Operable Unit (OU) 7-13/14 health and safety plan (HASP). This review will include time for discussion and questions. Upon completing site-specific training, personnel will sign the training acknowledgment form indicating that they have received this training, understand the tasks and associated hazards, and agree to follow all HASP and other safety requirement documents. The field team leader or subcontract technical representative will verify that all personnel working at the site have completed required training prior to permitting personnel to enter the work site.

Table A-1. Innovative subsurface stabilization project permeameter removal activity project-specific training.

Training	FTL, STR, and Health and Safety Officer	Other Field Team Members (including samplers)	Nonworker Access into the Contamination Reduction Zone	Support Zone Access Only
Project-specific HASP training[a]	Yes	Yes	Yes	–
Project-site orientation briefing[b]	–	–	–	Yes
40-Hour HAZWOPER training[c]	Yes[c]	Yes[c]	–	–
8-Hour HAZWOPER site supervisor training	Yes[d]	–	–	–

Table A-1. (continued).

Training	FTL, STR, and Health and Safety Officer	Other Field Team Members (including samplers)	Nonworker Access into the Contamination Reduction Zone	Support Zone Access Only
Fire extinguisher training (or equivalent)	Yes[e]	Yes[e]	–	–
CPR, medic first aid	Yes[e]	Yes[e]	–	–
Respirator training (contingency only)	f	f	–	–
Site access training (blue or orange card)	Yes	Yes	Yes	–

CPR = cardiopulmonary resuscitation FTL = field team leader HASP = health and safety plan
HAZWOPER = hazardous waste operations and emergency response STR = subcontract technical representative

Note: Shaded fields indicate that specific training is not required or is not applicable. Nonworkers will not be permitted in the exclusion zone (see Section A-7) during active permeameter removal activities.

a. This training includes project-specific hazard communications (HAZCOM), site-access and security, and decontamination and emergency response actions as required by 29 Code of Federal Regulations (CFR) 1910.120(e).

b. Orientation includes briefing of site hazards, restricted and controlled areas, emergency response actions, and personal protective equipment requirements. Personnel receiving project-site orientation briefing only are limited to the support zone and must be escorted by a project supervisor or designee fully trained in this health and safety plan.

c. This training includes 40 hours of classroom training and 24 hours of field-supervised experience. This training is required for the project field team leader or subcontract technical representative and the health and safety officer during excavation activities.

d. This training is required for the project field team leader or subcontract technical representative and the health and safety officer during training and qualification of personnel at Cold Test Pit South for actual operations in the Operable Unit 7-10 Pit 9 site.

e. At least one trained person should be onsite when the field team is working. The health and safety officer will determine the appropriate number of personnel requiring training.

f. Respirator training is required if personnel will be entering an area requiring respiratory protection (e.g., if action levels are exceeded or an industrial hygiene sampling shows respirators required).

A-5. OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM

Based on the existing site-specific information available for this project, no additional Occupational Medical Surveillance Program requirements apply to the work described in this appendix. The simulated waste being excavated contains chemical constituents described in Section A-8 of this appendix of the main body of this document, but does not have the potential to trigger personnel participation in the INEEL Occupational Medical Surveillance Program. Section 5 of the main body of this document has detailed information about the Occupational Medical Surveillance Program requirements.

A-6. ACCIDENT PREVENTION PROGRAM

The activities addressed in this appendix will be performed under approved work control documentation prepared and authorized in accordance with the requirements in Standard (STD) -101, "Integrated Work Control Process"; Management Control Procedure (MCP) -3571, "Independent Hazard Review"; and Program Requirements Document (PRD) -25, "Activity Level Hazard Identification, Analysis, and Control." See Section 6 of the main body of this document for information about Accident Prevention Program requirements.

A-7. SITE CONTROL AND SECURITY

The HSO is responsible for working with the industrial hygienist and safety engineer to establish site boundaries. The HSO will establish control zones for the permeameter removal activities with consideration for minimizing personnel exposure to hazards at the cold test pit work site. At a minimum, the site control zones will consist of an exclusion zone established around the excavation and soil disturbance areas. A support zone (SZ) will be established outside of the exclusion zone to provide a clean area for materials staging and administrative activities. The work zones will be continually evaluated by the field team leader or subcontract technical representative, or the HSO, and will be adjusted as needed upon consultation with the industrial hygienist and safety engineer. Figure A-1 provides a general map for possible zones at the permeameter removal activity site. The HSO will designate the exclusion zone based on input from safety and industrial hygiene.

A-7.1 Support Zone

The SZ for permeameter removal activities will consist of the areas outside of the controlled work and restricted areas of the Cold Test Pit South and will generally include the project administrative trailer and other areas not otherwise marked or delineated. The SZ is established to prevent inadvertent entry into a more restrictive area of the project site and to control access to the general project site. Visitors and nonfield team members must be aware at all times of heavy equipment and vehicle traffic lanes intersecting with the SZ area.

Support facilities (e.g., the project administrative trailer, vehicle parking, additional emergency equipment, extra personal protective equipment [PPE], and stored monitoring and sampling equipment) may all be located in the SZ. Visitors who do not have appropriate training to access controlled work areas or have not received site-specific training will be restricted to the SZ. All personnel who require entry into the Cold Test Pit South area must complete required PPE training to wear the required PPE (Level D) (see Section 9 of the main body of this document) to access the area.

A-7.2 Exclusion Zone

An exclusion zone large enough to encompass permeameter removal activities will be located southeast of the weather structure. The exclusion zone will be arranged to provide adequate room for equipment to maneuver while excavating soil from around the permeameters. The exclusion zone should consist of the area around the permeameters, the excavation access ramp, and soils pile. The HSO will designate the exclusion zone based on input from safety and industrial hygiene.

A-7.3 Designated Eating and Smoking Area and Site Security

See Section 7 of the main body of this document for requirements related to the permeameter removal activities, designated eating and smoking areas, and the site security requirements.

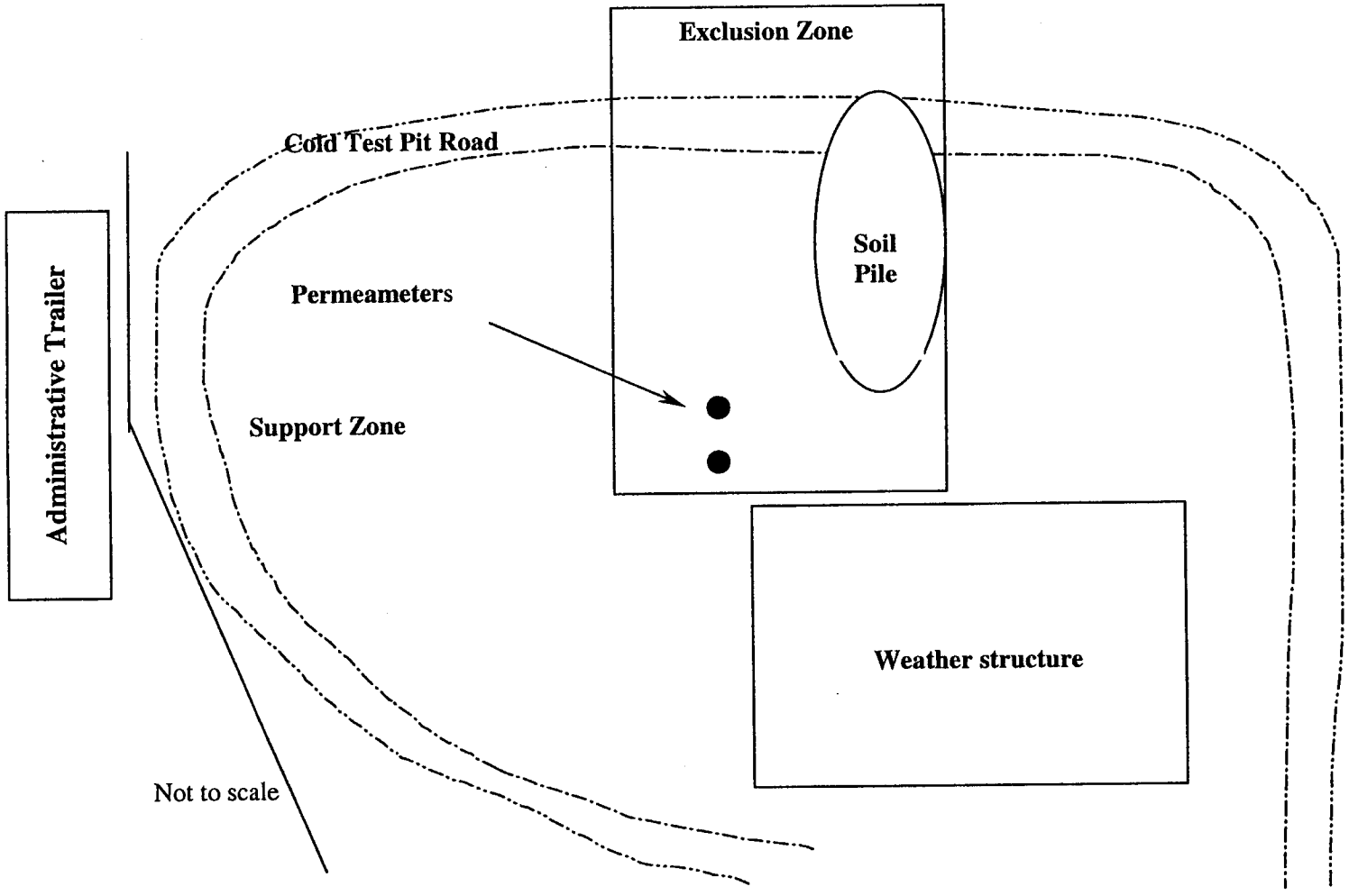

Figure A-1. General configuration of the innovative subsurface stabilization project permeameter removal activity site at Cold Test Pit South.

A-8. HAZARD EVALUATION

Section 8 of the main body of this document provides general information about the types of hazards that may be encountered while performing work at the cold test pits (including the Cold Test Pit South). Applicable areas covered in Section 8 of the main body of this document include industrial hygiene exposure assessments, biological hazards, routes of exposure, industrial hygiene monitoring, temperature extremes, noise, fire or explosion hazards, confined spaces, excavation, material handling, powered equipment and tools, heavy equipment and machinery, electrical or energized system hazards, personal protective equipment, and inclement weather.

A-8.1 Excavation, Surface Penetrations, and Outages

Excavation tasks will be required at Cold Test Pit South to remove the permeameters. No underground utilities are located near any pits within Cold Test Pit South. An outage from the RWMC outage coordinator will document the excavation area clearance. An excavation competent person will be designated for all excavation tasks. The final elevation depth to the bottom of the monolith is expected to be approximately 3 to 4.5 m (10 to 15 ft) below existing grade. All excavation activities will be conducted and monitored in accordance with PRD-22, "Excavation and Surface Penetration," and 29 CFR 1926, Subpart P, "Excavations." Some key elements from these requirements include the following:

- Excavations, the adjacent areas, and protective systems will be inspected daily by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. The inspection will be conducted by the competent person prior to the start of work, as needed throughout the shift, and after every rainstorm or other hazard-increasing occurrence.

- Sloping or benching will be constructed and maintained in accordance with the requirements set forth in 29 CFR 1926, Subpart P, Appendix B, for the soil type as classified by the competent person. This classification of the soil deposits will be based on the results of at least one visual and at least one manual analysis. For all sloping requirements, soil classification for Cold Test Pit South soil is assumed to be Type C soil. If the excavation is not sloped on all sides, then unprotected sides or edges 1.8 m (6 ft) or more above a lower level will be protected from falling by the use of guardrail systems, safety net systems, personal fall-arrest systems, or restricted area or access locations (controlled access zones) established to prevent personnel access to the unprotected sides or edges. If the depth of the excavation exceeds 1.5 m (5 ft), personnel shall not enter the excavation area unless (1) it has been determined by a competent person to be safe with adequate slope (1.5 to 1), and (2) access routes have been verified by the competent person in accordance with PRD-22, "Excavation and Surface Penetration," and (3) a confined space evaluation has been completed and documented by the industrial hygienist in accordance with MCP-2749, "Confined Spaces."

Specific hazards associated with the innovative subsurface stabilization project permeameter removal activity, as identified for this operation, are presented in the following section.

A-8.2 Hazards Assessment

The specific simulated waste forms buried in each permeameter unit contain 33 nominal 55-gal drums intermingled with soil, with approximately 40% simulated waste forms and 60% soil. As discussed in Section A-1.3, an estimated 33 drums were interred in each permeameter, four of which were metal (probably containing soil) and the remaining 29 of which were cardboard (Loomis et al. 1997). All drums

contained polyethylene bag liners. Thirteen of the drums contained combustible materials including a mixture of wood, blotter paper, and cloth. Twelve of the drums contained sludge material (three with granular sodium and potassium nitrate, four with INEEL soil, and five with vegetable oil and absorbents). Eight of the drums contained metal, concrete, and asphalt. Approximately 200 g (0.44 lb) of insoluble cerium oxide powder was added to all of the drums as a radiological simulant. Five 0.6 × 0.6 × 0.9-m (2 × 2 × 3-ft) sacks containing simulated combustible waste including cloth and paper also were placed in each culvert. The hazards associated with the chemical constituents comprising the simulated waste forms are identified in Table A-2. The project tasks, associated hazards, and appropriate mitigation are presented in Table A-3. The potential hazardous agents and the equipment available for sampling or monitoring of these agents, as determined appropriate by the industrial hygienist, are identified in Table A-4.

A-8.3 Other Site Hazards and Inspections

Task-site personnel should continually look for potential hazards and immediately inform the field team leader or subcontract technical representative, or HSO, so that action can be taken to correct the condition. The HSO and field team leader, or subcontract technical representative, will inspect the site periodically to ensure that barriers and signs are being maintained, unsafe conditions are corrected, and debris is not accumulating on the site. These inspections will be conducted in addition to the regulatory mandate of conducting daily excavation inspections.

The field team leader or subcontract technical representative (or designee) will perform periodic safety inspections using an appropriate checklist in accordance with MCP-3449, "Safety and Health Inspections." In addition, targeted or required self-assessments may be performed during mockup activities in accordance with MCP-8, "Self-Assessments Process for Continuous Improvement." All inspections and assessments will be noted in the field team leader logbook. Health and safety professionals present at the task site may, at any time, recommend changes in work habits to the field team leader or subcontract technical representative. However, all changes that may affect the project's written work control documents (i.e., all technical procedures, work orders, this HASP, job safety analyses, and safe work permits) must have concurrence from the appropriate project technical discipline representative onsite and have a document action request on Form 412.11, "Document Management Control System (DMCS) Document Action Request (DAR)," as required.

Table A-2. Evaluation of simulated waste materials buried in the innovative subsurface stabilization project permeameters.

Permeameter Simulated Waste or Hazardous Material (CAS #)	Exposure Limit[a] (PEL/TLV)	Routes of Exposure	Symptoms of Over Exposure[b] (acute and chronic)	Target Organs and Systems	Carcinogen (source)[c]	Exposure Potential (regardless of personal protective equipment)
Inorganic Compounds						
$CaSiO_3$ (cement) (1344-95-2)	TLV-10 mg/m^3 (inhalable) 5 mg/m^3 (respirable)	Inhalation, ingestion, and contact hazard	Irritation eyes, skin, and upper respiratory system	Eyes, skin, and respiratory system	No	Low Material is mixed in the waste container. Grouting operations should encapsulate the material. Highest potential is during monolith excavation and sampling.
Clay and micro cell (12141-46-7)	None established	Inhalation, ingestion, and contact hazard	Irritation eyes, skin, and respiratory system; cough	Eyes and respiratory system	No	Low Material is mixed in the waste container. Grouting operations should encapsulate the material.
KNO_3 (7757-79-1)	None established	Inhalation, ingestion, and contact hazard	Respiratory irritation (inhalation or ingestion pain, nausea, and vomiting)	None identified—primarily a localized irritant	No	Low Material is mixed in the waste container. Grouting operations should encapsulate the material.
Silica, crystalline – quartz (cement) (14808-60-7)	TLV-0. 05 mg/m^3 (respirable fraction) OSHA PEL (respirable) TWA 10 $mg/m^3/(\%SiO_2 + 2)$ Quartz (total dust): TWA 30 $mg/m^3/(\%SiO_2 + 2)$	Inhalation and contact hazard	Pulmonary fibrosis and silicosis	Respiratory	ACGIH-A2	Low Material is mixed in the waste container. Grouting operations should encapsulate the material. Highest potential is during monolith excavation and sampling.

Table A-2. (continued).

Permeameter Simulated Waste or Hazardous Material (CAS #)	Exposure Limit[a] (PEL/TLV)	Routes of Exposure	Symptoms of Over Exposure[b] (acute and chronic)	Target Organs and Systems	Carcinogen (source)[c]	Exposure Potential (regardless of personal protective equipment)
$NaNO_3$ (7631-99-4)	None established	Inhalation, ingestion, and contact hazard	Respiratory, eyes, and dermis (inhalation or ingestion may cause cyanosis)	None identified; primarily a localized irritant	No	Low Material is mixed in the waste container. Grouting operations should encapsulate the material.
CeO_2	None established	Inhalation, contact hazard, and ingestion	Respiratory irritation and pulmonary fibrosis	Respiratory system	No	Low to moderate Tracer compound is distributed throughout simulated waste forms. Grouting operations should encapsulate the material.
Canola Oil	None established	Contact hazard	Irritation of skin and eyes	Local irritation for contact pathway	No	Low Material is mixed in the waste container with absorbent or other material to create sludge-like mixture. Grouting operations should encapsulate the material.

a. American Conference of Governmental Industrial Hygienists (ACGIH) 2001 TLV Booklet and OSHA 29 CFR 1910 substance specific standards.

b. Nervous system: dizziness, nausea, and lightheadedness. Dermis: rashes, itching, and redness. Respiratory: respiratory effects. Eyes: tearing and irritation.

c. If yes, identify agency and appropriate designation (ACGIH A1 or A2; National Institute for Occupational Safety and Health [NIOSH]; OSHA; International Agency for Research on Cancer [IARC]; National Toxicology Program [NTP]).

VD = vapor density (Air = 1) C = ceiling value CNS = central nervous system CVS = cardiovascular system
GI = gastrointestinal PEL = permissible exposure limit STEL = short term exposure limit TLV = threshold limit value

Material safety data sheets for these chemicals will be available at the project site.

Table A-3. Project tasks, associated hazards, and mitigation.

Tasks	Potential Hazards and Hazardous Agents	Hazard Elimination, Isolation, or Mitigation
• Site preparation • Equipment mobilization and demobilization • Excavation and removal of permeameters • Inspection, sorting, sizing, and sampling of excavated materials • Disposing of excavated materials • Material staging, removal, and site restoration	1. **Simulated waste material contact or exposure and other chemicals at the task site**—Direct contact with simulated waste materials (if not encapsulated by grouting operation), contact with grout material (high pH), equipment maintenance or leaks of fuels or lubricants, exposure to dust, and CO and NO_x. 2. **Pinch points, caught-between, struck-by, and overhead hazards**—Equipment assembly and placement, vehicle or equipment movement, excavation, simulated waste handling and sizing, and material handling. 3. **Lifting and back strain**—Handling equipment and materials, sorting, sampling, and handling simulated waste materials, and movement. 4. **Tripping hazards, uneven terrain, walking, and working surfaces**—Cold test pit area, wet or muddy surfaces, equipment, cables, and lines on the ground, and inside weather structure. 5. **Hoisting and rigging**—Positioning equipment at project site, forklift operation, and retrieval confinement structure (RCS), glovebox, simulated waste pit, and weather structure assembly and disassembly. 6. **Heated surfaces, heat, and cold stress**—Equipment motors and exhaust surfaces, outdoor work, summer, fall, and winter temperatures, and PPE usage. 7. **Hazards noise levels**—Trucks, pumps, drill rig, heavy equipment, compressors, and hand tools. 8. **Energy sources**—High-pressure lines and displacement pump, and electrical, mechanical, thermal, and compressed air systems.	1. Establishing work zones to minimize personnel exposure. Using MSDSs for all chemicals used. Using PPE as required to reduce skin contact and exposure to chemicals. Exposure monitoring conducted in accordance with industrial hygiene determination. Using engineering controls for equipment operation (exhaust and general dilution ventilation). Using water misting to reduce dust creation. Donning PPE (as required). 2. Using qualified operators; using spotter and backup alarms; controlling work zone access; conducting personnel briefing on work area hazards; using body position awareness; donning hand, head, and body PPE as appropriate for activities; and using tag lines as determined necessary for hoisting and rigging activities. 3. Using mechanical lifting and movement devices for heavy or awkward materials. Using proper lifting techniques or two-person lifts (as required) for manual handling. Adjusting the workstation to reduce ergonomic stress. 4. Controlling access to the work zones. Identifying and mitigating tripping hazards and marking where possible. Maintaining good housekeeping and keeping walking and working surfaces clean (where feasible). 5. Controlling access to work zones; using qualified operators and certified rigging and following PRD-160, "Hoisting and Rigging," requirements; using tag lines; and imposing wind restrictions. 6. Controlling access to work zones. Identifying and labeling known heated surfaces where contact is possible. Conducting industrial hygiene monitoring and work-rest or warmup cycles (as required). Donning proper selection of work clothing or PPE. Conducting heat and cold stress personnel training. 7. CWA: conducting industrial hygiene sound-level monitoring and dosimetry for source identification; wearing hearing protection devices. 8. CWA and restricted areas: ensuring sources are posted and labeled; having tie downs and whip checks; conducting training; isolating energy source (through lockout/tagout) for all maintenance activities; PPE.

CWA = controlled work area PRD = program requirements document MSDS = material safety data sheet PPE = personal protective equipment

Table A-4. Potential hazardous agents and sampling equipment.

Chemical Hazard to Be Monitored or Sampled	Equipment and Monitoring or Sampling Method [a,b]	
Petroleum hydrocarbons and distillates Nuisance particulates, NOC (respirable) Crystalline silica (respirable) Diesel exhaust	Personal sampling pumps with appropriate media	Petroleum distillate—NIOSH 1550 Particulates, total nuisance (respirable)—NIOSH 0600 Crystalline silica (respirable)—NIOSH 7500 Diesel exhaust—NIOSH 5040
Petroleum hydrocarbons (VOCs)	FID, PID, or equivalent	
CO, NO_2	MSA-361 or equivalent, with CO and NO_2 cells	
Hazardous noise levels (> 85 dBA for an 8-hour workday, 83 dBA for a 10-hour day, > 140-dBA impact)	ANSI Type S2A sound level meter and ANSI S1.25-1991 dosimeter (A-weighted scale for TWA dosimetry, C-weighted for impact dominant sound environments)	
Heat and cold stress	Heat stress—WBGT, body weight, fluid intake	Cold stress—ambient air temperature, wind chill charts

a. Air sampling will be conducted as deemed appropriate by project industrial hygiene personnel based on initial direct reading instrument data, operation, and professional judgment.

b. Analytical method will be selected by the industrial hygienist based on site-specific conditions.

ANSI = American National Standards Institute
dBA = decibel A-weighted
FID = flame ionization detector
NIOSH = National Institute of Occupational Safety and Health
NOC = not otherwise classified
PID = photoionization detector
TWA = time-weighted average
VOC = volatile organic compound
WBGT = wet bulb globe temperature

A-9. PERSONAL PROTECTIVE EQUIPMENT

The Cold Test Pit South area poses low to moderate potential hazards to all personnel from the ongoing construction, operation, and maintenance activities (Loomis et al. 1997). A description of the levels of PPE, upgrading and downgrading criteria, and PPE inspection criteria are specified in Section 9 of the main body of this document. Visitors to the site not requiring access into the exclusion zone will require as a minimum hard hats, safety glasses with side shields, and sturdy leather boots above the ankles. Table A-5 provides the innovative subsurface stabilization permeameter removal project tasks, PPE levels, and PPE upgrade contingencies.

Table A-5. Project task-based personal protective equipment requirements and modifications.

Task	Level of Personal Protective Equipment	Category: Primary or Contingency	Modifications and Comments
All Permeameter Removal Project Activities			
• Site preparation • Equipment mobilization and demobilization • Excavation and removal of permeameters • Inspection, sorting, sizing, and sampling of excavated materials • Disposing of excavated materials • Material staging, removal, and site restoration	Level D	Primary	Level D PPE as defined in Section 9.2 of the main body of this document. In addition, personnel entering the exclusion zone will wear safety-toed boots. Modifications for specific hand protection for material handling and sampling tasks will be defined by the HSO.
	Modified Level D	Upgrade contingency	Upgrading to modified Level D (protective clothing, Tyvek coveralls or equivalent) may be required if action levels are exceeded or contact with simulated waste material cannot be avoided (prolonged and extensive skin contact).
	Level C	Upgrade contingency	If airborne contaminants increase to concentrations above established action limits, Level C full-face air-purifying respiratory protection will be worn in conjunction with chemical protective clothing (cartridge to be selected by project industrial hygienist based on airborne hazard).

A-10. DECONTAMINATION PROCEDURES

The innovative subsurface stabilization permeameter removal project activities are being conducted at the job site with no hazardous or radiological constituents. Though some of the raw materials used in the simulated waste mixture could present a potential inhalation or skin hazard, the use of engineering and administrative controls should minimize personnel exposure. Therefore, hazardous or radiological decontamination is not required. If simulated waste materials or grout are encountered at levels that present a contact or airborne release hazard to personnel, implementation of additional engineering controls, or some wetting or limited decontamination procedures, may be required to mitigate the potential hazards. In addition, equipment may be cleaned (i.e., decontaminated) at the end of the project using gross mechanical techniques, wiping, or steam cleaning, as required.

A-10.1 Contamination Control and Prevention

If contamination is encountered, additional wetting or engineering controls will be used to mitigate contact or airborne hazards. Contamination control and prevention procedures will be implemented to minimize personnel contact with contaminated surfaces if such surfaces are encountered and contacted. The following contamination control and prevention actions will be employed if contamination is encountered:

- Identify potential sources of contamination and design containment, isolation, and engineering controls to eliminate or mitigate any potential for contact or release of contaminants
- Limit the number of personnel, equipment, and materials that enter the contaminated area
- Implement immediate decontamination procedures to prevent the spread of contamination (if contamination is found on the outer surfaces of equipment)
- Use only the established control entry and exit point from the contaminated area to minimize the potential for cross-contamination and expedite contamination control surveys
- Wear disposable outer garments and use disposable equipment (where possible).

A-10.2 Personnel and Equipment Decontamination

Decontamination procedures for personnel and equipment are not anticipated to be required beyond normal PPE changeout and equipment cleaning, respectively. If waste contact cannot be avoided (e.g., excessive contact from prolonged periods that may cause skin irritation or drying or dermatitis), then additional engineering controls, in combination with PPE upgrades, may be necessary to control the contact hazard. Equipment will be decontaminated based on the source of contamination.

A-10.3 Modified Level D Personal Protective Equipment Doffing and Decontamination (if required)

If required to be worn, modified Level D protective clothing (e.g., disposable coveralls) will be doffed following standard removal techniques (rolling outside surface inward and down) and will constitute the initial decontamination step. All PPE will be placed in the appropriately labeled containers. Cloth coveralls may be reused as long as they remain serviceable in accordance with an industrial hygienist and safety professional's judgment call.

A-10.4 Level C Personal Protective Equipment Doffing and Decontamination (if required)

If respiratory protection is worn in conjunction with protective clothing (e.g., Level C PPE [see Section 9 of the main body of this document]), then the modified Level D (see Section 9 of the main body of this document) sequence will be followed with one additional step. For that additional step (following protective clothing doffing), respirators will be removed and placed in a separate container.

A-10.5 Site Sanitation and Waste Minimization

Site personnel will use the portable toilet facilities provided in the Cold Test Pit South or restroom facilities inside the RWMC area. Potable water and soap, or hand and face sanitary wipes, will be available within the administrative trailer or the RWMC facility for personnel to wash their hands and face upon exiting the work area.

Waste materials will not be allowed to accumulate at the project task sites. Appropriately labeled containers for industrial waste and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq.) waste will be maintained at the project site. Personnel should make every attempt to minimize waste through the judicious use of consumable materials. All site personnel are expected to make good housekeeping a priority at the job site.

A-11. EMERGENCY RESPONSE PLAN FOR COLD TEST PIT SOUTH

Section 11 of the main body of this document defines the responsibilities of personnel working at the cold test pits (including Cold Test Pit South) and the INEEL Emergency Response Organization by providing an emergency response plan for guidance in responding to abnormal events during activities at the pits. Section 11 is applicable to the innovative subsurface stabilization permeameter removal project activities and will be implemented as applicable.

A-12. REFERENCES

29 CFR 1910.120, 2002, Title 29, "Labor," Part 1910, "Occupational Safety and Health Administration," Subpart H, "Hazardous Materials," Section 1910.120, "Hazardous Waste Operations and Emergency Response," *Code of Federal Regulations*, Office of the Federal Register, February 8, 2002.

29 CFR 1926, Subpart P, 2002, Title 29, "Labor," Part 1926, "Safety and Health Regulations for Construction," Subpart P, "Excavations," *Code of Federal Regulations*, Office of the Federal Register.

29 CFR 1926.65, 2002, Title 29, "Labor," Part 1926, "Safety and Health Regulations for Construction," Subpart D, "Occupational Health and Environmental Controls," Section 1926.65, "Hazardous Waste Operations and Emergency Response," *Code of Federal Regulations*, Office of the Federal Register, April 15, 2002.

42 USC § 9601 et seq., 1980, "Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA/Superfund)," *United States Code*, December 11, 1980.

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STD-101, 2001, "Integrated Work Control Process," Rev. 12, Operations, September 19, 2001.

Appendix B

OU 7-10 Glovebox Excavator Method Project Mockup at Cold Test Pit South

Appendix B

OU 7-10 Glovebox Excavator Method Project Mockup at Cold Test Pit South

B-1. INTRODUCTION

The 1993 Pit 9 Record of Decision (ROD) (DOE-ID 1993) required the removal and treatment of transuranic contaminated waste within the Pit 9 area. A 1998 Explanation of Significant Differences (DOE-ID 1998) to the Pit 9 ROD defined a three-stage approach to the remediation. Stage II is a retrieval demonstration effort that includes excavation of soils and waste from a 6 × 6-m (20 × 20-ft) area in Pit 9 (INEEL 2001). Pit 9 is located in the Subsurface Disposal Area (SDA) of the Radioactive Waste Management Complex (RWMC) of the Idaho National Engineering and Environmental Laboratory (INEEL) and was designated Operable Unit (OU) 7-10 under the Federal Facility Agreement and Consent Order (DOE-ID 1991) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC § 9601 et seq.). On April 18, 2002, an Agreement to Resolve Disputes was reached between the U.S. Department of Energy (DOE), the Idaho Department of Environmental Quality (IDEQ), and U.S. Environmental Protection Agency (EPA), which established the Pit 9 schedule and activities for the three stages (DOE 2002).

The initial Stage II design, developed through collaboration between the U.S. Department of Energy Idaho Operations Office (DOE-ID), IDEQ, and EPA was a complex design that incorporated methodical waste retrieval and precise recovery processes including in situ characterization data-control similar to that of an archaeological excavation. As a result of a study to find a safe, faster, and less costly means to conduct the Stage II retrieval demonstration (INEEL 2001), a simplified method, identified as the glovebox excavator method, was developed. The method, which incorporates a retrieval confinement structure (RCS) located over the excavation site with multiple packaging glovebox systems (PGSs) attached directly to the RCS that are fed by track-guided transfer carts, will be tested in a mockup performed at Cold Test Pit South over the in situ grouting (ISG) test pit. Cold Test Pit South is located south of the SDA in the RWMC. Figures 1, 2, and 3 of the main body of this document are maps of the INEEL, RWMC, and Cold Test Pit South showing the ISG test pit, respectively.

A standard backhoe will be used to excavate pit waste materials. The backhoe boom and stick will be housed inside the RCS, while the operator and other excavator components will be located outside the RCS. The entire system will be enclosed by a large fabric-skinned weather enclosure structure (WES). The OU 7-10 personnel will perform a mockup of the Glovebox Excavator Method Project system at Cold Test Pit South over the ISG test pit to evaluate system design, equipment, operational procedures and techniques, operator training, and methods proposed relative to future work in Pit 9 in a nonradiological environment.

B-1.1 Purpose

This appendix establishes the minimum requirements that will be used to eliminate or minimize health and safety risks to personnel working on the OU 7-10 Glovebox Excavator Method Project mockup activities that will be performed at Cold Test Pit South over the ISG test pit. For information on the applicable requirements included in INEEL manuals and the Occupational Safety and Health Administration (OSHA) standard, 29 Code of Federal Regulations (CFR) 1910.120 and 1926.65, "Hazardous Waste Operations and Emergency Response (HAZWOPER)," see Section 1 of the main body of this document.

B-1.2 Scope

Mockup testing will involve the excavation and processing of soil and simulated waste from the ISG test pit at Cold Test Pit South. The mockup system will be set up over the ISG test pit inside the large yurt located at Cold Test Pit South (see Figure 3 in the main body of this document). The mockup tests will include the operation of a backhoe, backhoe end effectors, depth monitor, overburden soil sacks, simulated RCS and PGS systems, simulated weather enclosure structure, and other equipment that may be determined as necessary by design engineering or operations personnel to evaluate the OU 7-10 Glovebox Excavator Method Project.

The objective of mockup testing is to address the performance and ability of system equipment and operations personnel to safely execute the OU 7-10 Glovebox Excavator Method Project. The information obtained will assist with design engineering, equipment evaluations, operational procedure development, and operator training. The mockup tests will be performed as described in an internal INEEL report.[a] The test objectives include investigating the following:

- As-built drawings of the backhoe
- Soil sack manipulation
- JAW bucket and 55-gal drum interference
- Backhoe bucket and PGS transfer cart interference
- End effector and glove port interference
- End effector remote coupling
- Hydraulic line protection for end effectors
- Physical stops
- Visibility of the operator
- Excavation of the waste zone
- Navigating around and handling of Type A probes
- Application of absorbent
- Aggregate demolition
- Overburden soil sack manipulation
- Core sampling

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a. Preussner, Brian D., Bechtel BWXT Idaho, LLC, and Bruce P. Miller, Vortex Enterprises, 2002, "Mock-up Testing of the Backhoe and End Effectors for the OU 7-10 Glovebox Excavator Method Project," INEEL/INT-02-00724, Rev. 0, Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho.

- Other tests necessary to evaluate the design, operation, or execution of the project such as PGS operations; waste segregation, sizing, and bag-out sampling; and drum filling, sealing, and changeout.

Construction of the mockup system including initial overburden removal, shoring box installation, and RCS and PGS construction may be subject to the requirements of this health and safety plan (HASP) as determined by the field team leader (FTL) and HSO in accordance with approved work controls.

B-1.3 Idaho National Engineering and Environmental Laboratory Site Description

For details on the location and operational history of the INEEL, see Section 1.1 of the main body of this document.

B-1.4 Site Description

The ISG test pit is contained in Cold Test Pit South—one of two cold test pits located in the SDA. All work described in this appendix will be completed at Cold Test Pit South. For details on the RWMC, the Subsurface Disposal Area (SDA), Cold Test Pit South, and the ISG test pit, see Section 1.2 and Figures 1, 2, and 3 of the main body of this document.

B-1.4.1 OU 7-10 Glovebox Excavator Method Project Mockup Site Description

For mockup assembly and testing, the OU 7-10 Glovebox Excavator Method Project will use the in situ grouting (ISG) simulated waste, test pit, and weather enclosure constructed at the Cold Test Pit South area. All mockup systems and equipment will be assembled over the existing ISG test pit inside the weather enclosure currently in place over the ISG test pit (see Section 1.2.2.1 and Figure 3 of the main body of this document).

At Pit 9, the OU 7-10 Glovebox Excavator Method Project will incorporate an RCS located over the excavation site that consists of a steel-framed, steel-paneled structure with windows. The retrieval confinement structure will be located within a larger fabric-skinned weather enclosure structure (WES). A PGS will attach directly to the confinement structure and will be fed by track-guided transfer carts.

A standard backhoe will be used to perform soil excavation, probe removal, 55-gal drum removal (employing a JAW bucket design), and core sampling (employing a jackhammer/core sampler design). Hydraulic lines on the various backhoe end effectors will be coupled and uncoupled through the use of glove ports built into the 1.8-m (6-ft) RCS double access doors, while the end effectors will be attached and detached remotely through the use of a remote hydraulic coupler. Glove ports and a bag in/bag out port will be used to transfer core samples. The boom and stick of the excavator are to be housed inside the RCS, while the operator and other excavator components will be located outside the RCS and within the weather enclosure (see Figure B-1).

Construction of the OU 7-10 Glovebox Excavator Method Project mockup retrieval system will be completed at the Cold Test Pit South area over the ISG test pit. The assembly will be constructed with enough physical detail to simulate operational conditions (as described above) sufficiently to provide adequate process, systems, operations, and procedural evaluation information to validate the glovebox excavator method system before use at Pit 9. The mockup also may be used to train personnel for any outlier or unreviewed safety question items encountered in the actual Pit 9 excavation activity (INEEL 2002a, 2002b).

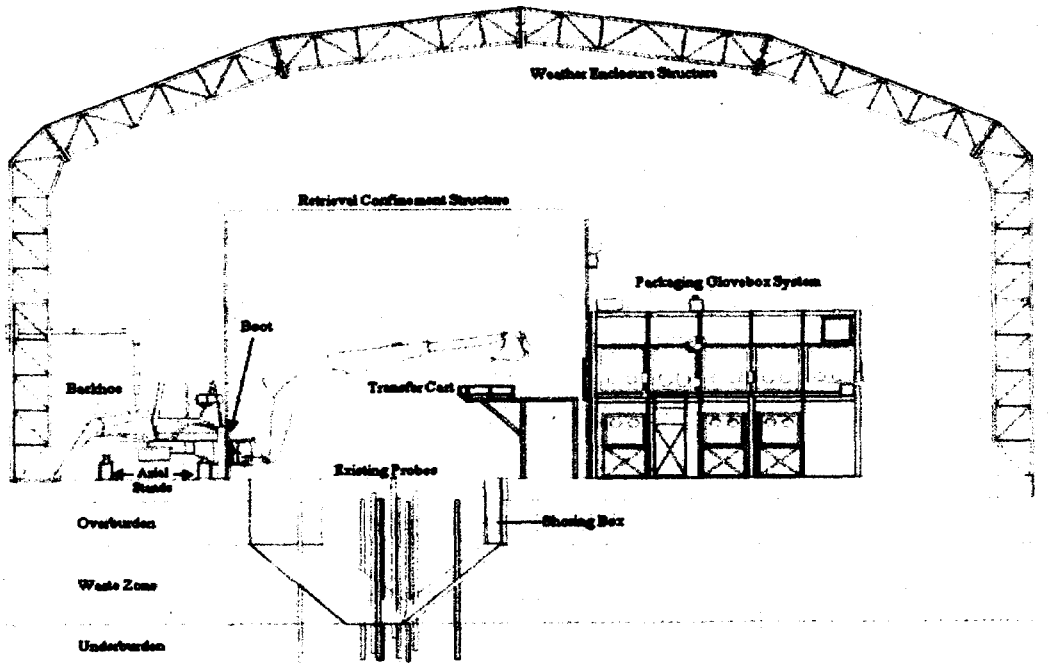

Figure B-1. Operable Unit 7-10 Glovebox Excavator Method Project.

B-2. KEY SITE PERSONNEL REQUIREMENTS

The organizational structure for work at Cold Test Pit South reflects the resources and expertise required to perform the work while minimizing risks to worker health and safety, the environment, and the general public. No site-specific changes from the main body of this document apply to this section. The key positions at the site, and the corresponding lines of authority and communications, are shown in the organizational chart in Figure 5 of the main body of this document. Descriptions and responsibilities of the key site personnel are detailed in Section 2 of the main body of this document.

The organizational structure for the OU 7-10 Glovebox Excavator Method Project's specific excavation mockup tests at the Cold Test Pit South is shown in Figure B-2.

The OU 7-10 Glovebox Excavator Method Project mockup lead is responsible for the scope, schedule, and budget for excavator test plan activities. The mockup lead coordinates all document preparation and field activities and ensures that all activities described in this appendix comply with remedial design/remedial action project procedures, applicable Bechtel BWXT Idaho, LLC (BBWI) standards, management control procedures (MCPs) and program requirements documents, and all applicable OSHA, EPA, DOE, U.S. Department of Transportation, and State of Idaho requirements. The mockup lead also ensures that excavation mockup test plan tasks comply with applicable INEEL quality requirements, this HASP, and other work control documents. The OU 7-10 Glovebox Excavator Method Project mockup lead reports to the OU 7-10 Glovebox Excavator Method project manager.

The Waste Area Group (WAG) 7 Cold Test Pit facility manager facilitates use of the INEEL Cold Test Pit South by WAG 7 projects and the OU 7-10 Glovebox Excavator Method Project for purposes of this mockup test. The facility manager is responsible for ensuring that all activities described in this appendix satisfy any special requirements governing the use of the Cold Test Pit South.

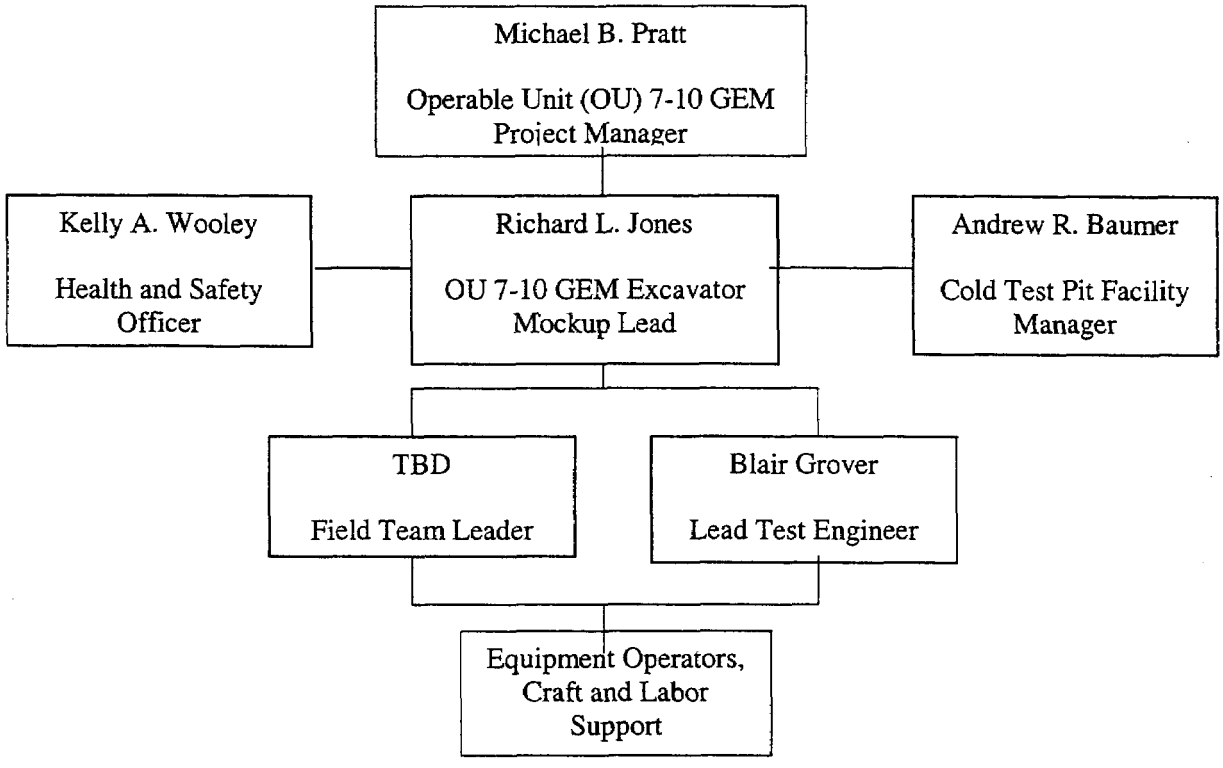

Figure B-2. Organization chart for OU 7-10 Glovebox Excavator Method Project excavator mockup test at Cold Test Pit South.

The FTL will represent the OU 7-10 Glovebox Excavator Method Project at the test site with delegated responsibility for the safe and successful completion of excavation mockup test. The FTL manages field activities and executes the technical procedure (TPR) and other work controls. The FTL enforces task-site control, documents activities, and may conduct the daily safety briefings at the start of the daily shift. Health and safety issues will be brought to the attention of the FTL. The FTL will report to the OU 7-10 Glovebox Excavator Method project mockup lead and will work closely with the lead test engineer to complete all testing.

The lead test engineer serves as the primary OU 7-10 Glovebox Excavator Method Project contact concerning the design and technical execution of the excavation mockup test described in this appendix. The lead test engineer is responsible for ensuring that all testing is conducted as described in this HASP, all data are collected and data sheets are complete, and necessary resources to complete the test are identified. The lead test engineer serves as the technical lead for all project process and equipment engineers onsite, engineering issues, and will work closely with the FTL to manage day-to-day mockup activities. The lead test engineer will work in conjunction with the FTL to document activities, manage the work, and coordinate activities for successful completion. The lead test engineer reports to the OU 7-10 Glovebox Excavator Method Project mockup lead for this activity and functionally to the OU 7-10 Glovebox Excavator Method Project engineering lead.

The health and safety officer (HSO) assigned to the task site serves as primary contact for health and safety issues. The HSO advises the FTL and lead test engineer on all aspects of health and safety. The HSO, along with everyone at the job site, is authorized to stop any and all work if any operation threatens worker safety or public health or safety. The HSO is authorized to verify compliance with this HASP, conduct inspections, and require and monitor corrective actions (as appropriate).

All heavy equipment operators will be appropriately qualified for the equipment to be operated. Labor and craft support will be used to prepare the excavation mockup test plan area and as needed during the tests. Craft and labor support personnel will take direction from the lead test engineer and FTL where support is directly needed during mockup tests and from construction engineers or managers when not directly involved with mockup test activities. When not working under work controls, craft and labor support will generally use STD-101 work packages to perform assigned tasks.

B-3. RECORD-KEEPING REQUIREMENTS

No site-specific changes from the main body of this document apply to safety and health record-keeping requirements. See Section 3 of the main body of this document for the general requirements for record keeping for this project.

B-4. PERSONNEL TRAINING

Training requirements for work completed in the cold test pits (including Cold Test Pit South) are addressed in Section 4 of the main body of this document. Additional project-specific requirements are identified in Table B-1.

Table B-1. Required OU 7-10 mockup project-specific training.

Training	FTL, STR, and Health and Safety Officer	Other Field Team Members (including samplers)	Non-worker Access into the Contamination Reduction Zone	Support Zone Access Only
Project-specific HASP training[a]	Yes	Yes	Yes	–
Project-site orientation briefing[b]	–	–	–	Yes
40-Hour HAZWOPER training[e]	Yes[e]	Yes[e]	–	–
8-Hour HAZWOPER site supervisor training	Yes[f]	–	–	–
Fire extinguisher training (or equivalent)	Yes[c]	Yes[c]	–	–
CPR, medic first aid	Yes[c]	Yes[c]	–	–
Respirator training (contingency only)	d	d	–	–
Site access training (blue or orange card)	Yes	Yes	Yes	–

Table B-1. (continued).

Training	FTL, STR, and Health and Safety Officer	Other Field Team Members (including samplers)	Non-worker Access into the Contamination Reduction Zone	Support Zone Access Only

Note: Shaded fields indicate specific training is not required/applicable. Non-workers will not be permitted in the exclusion zone during active mockup activities.

a. Includes project-specific HAZCOM, site-access and security, and decontamination and emergency response actions, as required by 29 CFR 1910.120(e).

b. Orientation includes briefing of site hazards, restricted and controlled areas, emergency response actions, and personal protective equipment requirements. Personnel receiving project-site orientation briefing only are limited to the support zone and must be escorted by fully HASP-trained project supervisor or designee.

c. At least one trained person should be onsite when the field team is working. The health and safety officer will determine appropriate number of personnel requiring training.

d. This training is required only if personnel are entering an area requiring respiratory protection (e.g., if action levels are exceeded, or industrial hygiene sampling shows respirators are required).

e. This training includes 40 hours of classroom training and 24 hours field supervised experience. Required only for field personnel training for operations at OU 7-10 activities on Pit 9.

f. This training is required for the field team leader or subcontract technical representative, and health and safety officer during training and qualification of personnel at Cold Test Pit South for actual operations in the OU 7-10 Pit 9 SDA site.

CPR = cardiopulmonary resuscitation HASP = health and safety plan FTL = field team leader. STR = subcontract technical representative

B-5. OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM

Based on the existing site-specific information available for this project, no additional Occupational Medical Surveillance Program requirements in addition to those identified in the main body of this document apply to this section. The simulated waste being excavated contains chemical constituents described in Section B-8, but does not have the potential to trigger personnel participation in the INEEL Occupational Medical Surveillance Program. See Section 5 of the main body of this document for information about the Occupational Medical Surveillance Program requirements.

B-6. ACCIDENT PREVENTION PROGRAM

The activities addressed in this appendix will be performed under approved work control documentation prepared and authorized by the requirements in STD-101; MCP-3562, "Hazard Identification, Analyses, and Control of Operational Activities"; and MCP-3571, "Independent Hazard Review." See Section 6 of the main body of this document for information about accident prevention program requirements.

B-7. SITE CONTROL AND SECURITY

The HSO will be responsible for working with the industrial hygienist and safety engineer to establish the site boundaries. The HSO will establish control zones to simulate the zones to be used during the Pit 9 activities with consideration for minimizing personnel exposure to hazards at Cold Test Pit South. At a minimum, the site control zones will consist of an exclusion zone established around the excavation and soil disturbance areas. A contamination reduction zone (CRZ) will be established around the entire exclusion zone. A support zone (SZ) will be established outside of the CRZ to provide a clean area for materials staging and administrative activities. The work zones will be continually evaluated by the FTL or subcontract technical representative, or the HSO, and adjusted as needed upon consultation with the industrial hygienist and safety engineer. Figure B-3 is a general map of possible zones that will be established at the mockup by the HSO in conjunction with input from safety and industrial hygiene.

B-7.1 Support Zone

The SZ for the OU 7-10 mockup activities will consist of the areas outside of the controlled work and restricted areas of Cold Test Pit South and will generally include the project administrative trailer, areas outside the weather structure at the pit, and other areas not otherwise marked or delineated. The SZ is established to prevent inadvertent entry into a more restrictive area of the project site and to control access to the general project site. Visitors and nonfield team members must be aware at all times of heavy equipment and vehicle traffic lanes intersecting with the SZ area.

Support facilities (e.g., project administrative trailer, vehicle parking, additional emergency equipment, extra personal protective equipment, and stored monitoring and sampling equipment) all may be located in the SZ. Visitors who do not have appropriate training to access controlled work areas, or have not received site-specific training, will be restricted to the SZ. All personnel who require entry into the Cold Test Pit South area must complete required personal protective equipment training to wear the required personal protective equipment (Level D) to access the area (see Section 9 of the main body of this document).

B-7.2 Contamination Reduction Zone

The CRZ is a transition zone between the SZ and exclusion zone intended to reduce the potential for spreading contamination to the SZ. The CRZ will be arranged to provide a simulation of the intended zones in the OU 7-10 Glovebox Excavator Method Project SDA work site. The CRZ for the OU 7-10 mockup activities will consist of the areas around the exclusion zone as designated by the HSO in conjunction with input from safety and industrial hygiene.

B-7.3 Exclusion Zone

The exclusion zone will be large enough to encompass the OU 7-10 mockup activities located inside the weather structure. The exclusion zone will be arranged to provide a simulation of the intended zones at the SDA OU 7-10 Glovebox Excavator Method Project work site. The exclusion zone should consist of the area around the mockup of the RCS, gloveboxes, and excavator inside the weather structure. The HSO will designate the exclusion zone based on input from safety and industrial hygiene.

B-7.4 Designated Eating and Smoking Area and Site Security

See Section 7 of the main body of this document for the requirements related to the OU 7-10 Glovebox Excavator Method Project mockup designated eating and smoking area and the site security requirements.

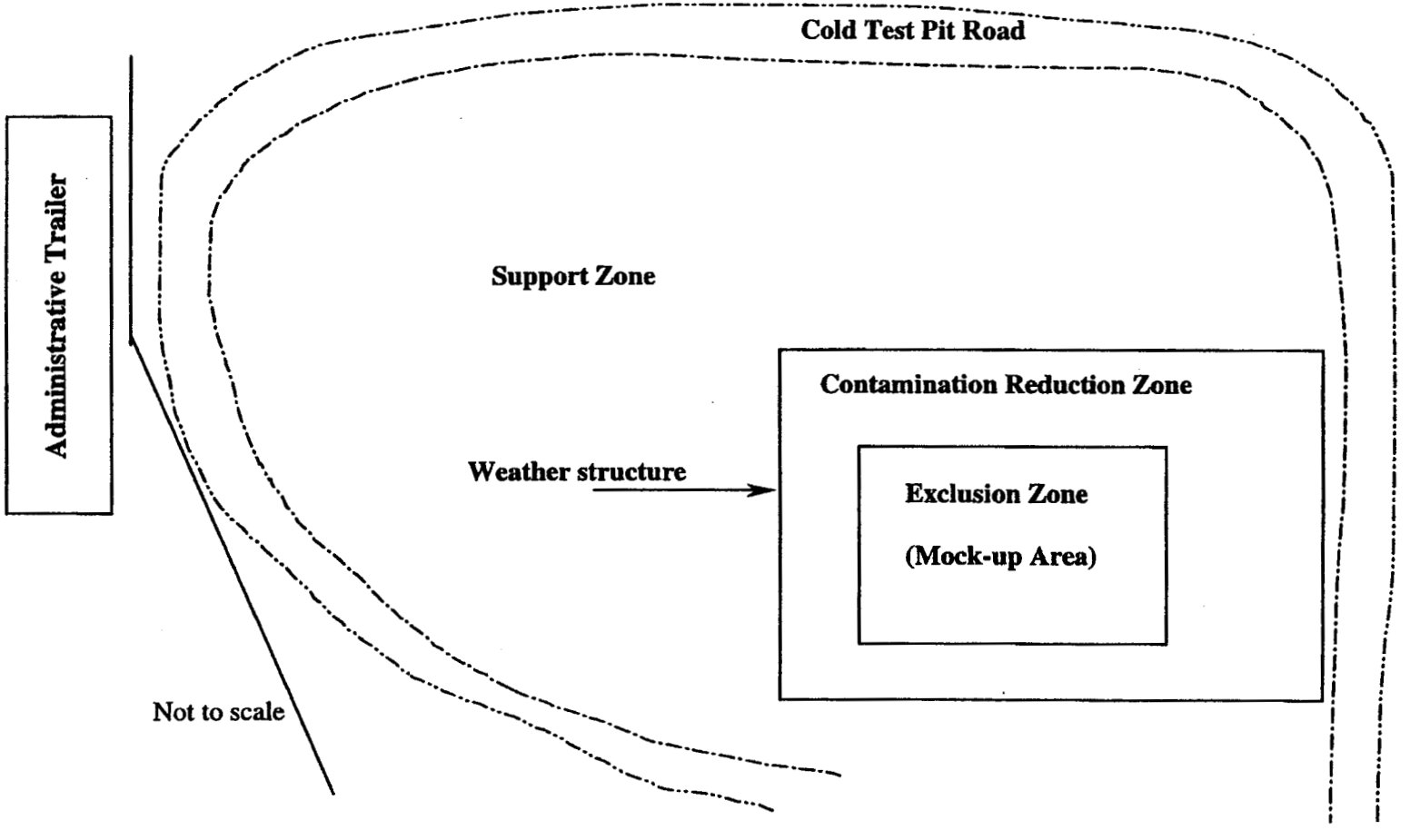

Figure B-3. General configuration of the OU 7-10 Glovebox Excavator Method Project mockup site at Cold Test Pit South.

B-8. HAZARD EVALUATION

Section 8 of the main body of this document provides general information about the types of hazards that may be encountered while performing work at Cold Test Pit South. Applicable areas covered in Section 8 of this HASP include industrial hygiene exposure assessments, biological hazards, routes of exposure, industrial hygiene monitoring, temperature extremes, noise, fire or explosion hazards, confined spaces, excavation, material handling, powered equipment and tools, heavy equipment and machinery, Electrical and energized system hazards, personal protective equipment, and inclement weather.

B-8.1 Excavation, Surface Penetrations, and Outages

Excavation tasks will be required at Cold Test Pit South to excavate soil and simulated waste forms in the mockup construction area. No underground utilities are located in the ISG test pit area of Cold Test Pit South. A person competent in assessing excavations will be designated for all excavation tasks. The final elevation depth to the bottom of the monolith is expected to be approximately 3 to 4.5 m (10 to 15 ft) below existing grade. All excavation activities will be conducted and monitored in accordance with PRD-22, "Excavation and Surface Penetration," and 29 CFR 1926, Subpart P, "Excavations." Some key elements of these requirements include the following:

- Excavations, the adjacent areas, and protective systems will be inspected daily by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. The inspection will be conducted by the competent person prior to the start of work, as needed throughout the shift, and after every rainstorm or other hazard-increasing occurrence.

- Sloping or benching will be constructed and maintained in accordance with the requirements set forth in 29 CFR 1926, Subpart P, Appendix B, for the soil type, as classified by the competent person. This classification of the soil deposits will be based on the results of at least one visual and at least one manual analysis. Soil classification for Cold Test Pit South soil is assumed to be Type C soil for all sloping requirements. If the excavation is not sloped on all sides, then unprotected sides or edges 1.8 m (6 ft) or more above a lower level will be protected from falling by the use of guardrail systems, safety net systems, personal fall-arrest systems, or restricted area or access locations (controlled access zones) established to prevent personnel access to the unprotected sides or edges. If the depth of the excavation exceeds 1.5 m (5 ft), personnel shall not enter the excavation area unless (1) it has been determined by a competent person to be safe with adequate slope (1.5 to 1), (2) access routes have been verified by the competent person in accordance with PRD-22 and (3) a confined space evaluation has been completed and documented by the industrial hygienist in accordance with MCP-2749, "Confined Spaces."

- Other special hazards or controls: Fire extinguishers will be positioned inside the yurt structure during excavation activities as directed by the HSO and the fire protection engineer. The exhaust from the excavator used in the mockup will be passively or mechanically vented to the outside of the yurt structure. General dilution ventilation will be provided by either providing for passive air movement or by mechanically blowing fresh air into the yurt. The industrial hygienist will monitor, as appropriate, for CO buildup during equipment operation inside the yurt, and mitigative actions will be implemented based on the industrial hygienist's measurements and recommendations.

Specific hazards associated with the OU 7-10 Glovebox Excavator Method Project mockup activities, as identified for this operation, are presented in this section.

B-8.2 Hazards Assessment

The specific simulated waste forms buried in the ISG test pit of Cold Test Pit South are summarized in Table B-2. The hazards associated with these chemical constituents are identified in Table B-3. The project tasks, associated hazards, and appropriate mitigation are presented in Table B-4. The potential hazardous agents and the equipment available for sampling or monitoring of these agents, as determined appropriate by the industrial hygienist, are presented in Table B-5.

Table B-2. Simulated waste packages for the Cold Test Pit South in situ grouting pit.

Waste Container Type	Number	Composition
Cardboard boxes (4 × 4 × 8 ft)	2	Metal debris (i.e., 1/8-in. plate steel, tubing, piping, and scrap metal), concrete and asphalt chunks (6-in. size), and pulverized wood. Metal 38%, concrete and asphalt 37%, and pulverized wood 25%
Drums (55 gal) or sacks	63	As listed below
• Cardboard	25	Combustibles (i.e., cloth, paper, wood, and plastic)
• Cardboard	13	Inorganic sludge (enough water to create a paste-like consistency; 390 lb soil, 40 lb dry Portland cement, and 36 lb $NaNO_3$)
• Cardboard (metal)	6	Organic sludge (38 gal of Texaco Regal Oil, 65 lb Micro Cell-E, and 35 lb kitty litter)
• Cardboard (metal)	5	Nitrate salts (granular: 60 wt% $NaNo_3$, 30 wt% KNO_3, 5 wt% Na_2SO_4, and 5 wt% NaCl
• Sacks (2 × 2 × 3 ft) (polyethylene)	14	Cloth and paper

B-8.3 Other Site Hazards and Inspections

Task-site personnel should look continually for potential hazards and immediately inform the field team leader (FTL) or subcontract technical representative, or HSO so that action can be taken to correct a problematic condition. The HSO and field team leader or subcontract technical representative will inspect the site periodically to ensure that barriers and signs are being maintained, unsafe conditions are corrected, and debris is not accumulating on the site. These inspections will be conducted in addition to daily excavation inspections.

The FTL or subcontract technical representative (or designee) will perform periodic safety inspections using an appropriate checklist in accordance with MCP-3449, "Safety and Health Inspections." In addition, targeted or required self-assessments may be performed during mockup activities in accordance with MCP-8, "Self-Assessments Process for Continuous Improvement." All inspections and assessments will be noted in the FTL logbook. Health and safety professionals present at the task site may, at any time, recommend changes in work habits to the FTL or subcontract technical representative. However, all changes that may affect the project's written work control documents (e.g., any technical procedures, work orders, this HASP, job safety analyses, and safe work permits) must have concurrence from the appropriate project technical discipline representative onsite and have a document action request prepared on Form 412.11, "Document Management Control system (DMCS) Document Action Request (DAR)," as required.

Table B-3. Evaluation of simulated waste materials buried in the in situ grouting test pit at Cold Test Pit South.

In Situ Grouting Test Pit Simulated Waste or Hazardous Material (CAS #)	Exposure Limit[a] (PEL/TLV)	Routes of Exposure	Symptoms of Over Exposure[b] (Acute and Chronic)	Target Organs and Systems	Carcinogen (Source)[c]	Exposure Potential (regardless of personal protective equipment)
Inorganic Compounds						
$CaSiO_3$ (cement) (1344-95-2)	TLV-10 mg/m^3 (inhalable) 5 mg/m^3 (respirable)	Inhalation, ingestion, and contact hazard	Irritation eyes, skin, and upper respiratory system	Eyes, skin, respiratory system	No	Low Material is mixed in waste container. Grouting operations should encapsulate the material. Highest potential is during monolith excavation and sampling.
CO (630-08-0) Equipment operating inside weather structure	TLV-25 ppm OSHA TWA – 50 ppm	Inhalation	Headache, tachypnea, nausea, lassitude (weakness and exhaustion), dizziness, confusion, hallucinations; cyanosis; depressed S-T segment of electrocardiogram, angina, and syncope	Cardiovascular system, lungs, blood, CNS	No	Low to Moderate Drill rig exhaust will be captured with active ventilation system and exhausted outside weather structure.
Clay, micro cell (12141-46-7)	None established	Inhalation, ingestion, and contact hazard	Irritation eyes, skin, respiratory system; cough	Eyes, respiratory system	No	Low Material is mixed in waste container. Grouting operations should encapsulate the material.
Diesel exhaust	TLV- 0.05 mg/m^3 (particulate aerodynamic diameter <1 μm (ACGIH 2000 notice of intended changes)	Inhalation	Respiratory irritation, nose, throat or lungs, with stinging and redness of the eyes, headache, nausea, dizziness, unconsciousness	Respiratory system	ACGIH – A2	Moderate Numerous exhaust sources exist at the project site.

Table B-3. (continued).

In Situ Grouting Test Pit Simulated Waste or Hazardous Material (CAS #)	Exposure Limit[a] (PEL/TLV)	Routes of Exposure	Symptoms of Over Exposure[b] (Acute and Chronic)	Target Organs and Systems	Carcinogen (Source)[c]	Exposure Potential (regardless of personal protective equipment)
Diesel fuel (8008-20-6) VD->1	TLV 100 mg/m^3 (ACGIH 2000 notice of intended changes)	Inhalation, skin absorption, and contact hazard	Eyes irritation, respiratory system changes, dermatitis	Eye and respiratory system	No	Moderate The fuel will be used to refuel equipment.
NO_x (nitrogen oxides) (Incomplete combustion by-product) equipment operating in weather structure	TLV – 3 ppm (NO_2) STEL – 5 ppm OSHA C – 5 ppm (NO_2)	Inhalation	Irritation eyes, nose, throat; cough, mucoid frothy sputum, decreased pulmonary function, chronic bronchitis, dyspnea (breathing difficulty); chest pain; pulmonary edema, cyanosis, tachypnea, tachycardia	Eyes, respiratory system, and cardiovascular system	No	Low to Moderate Drill rig exhaust will be captured with active ventilation system and exhausted outside weather structure.
KNO_3 (7757-79-1)	None established	Inhalation, ingestion, and contact hazard	Respiratory irritation, (ingestion—gastrointestinal pain, nausea and vomiting)	None identified—primarily a localized irritant	No	Low Material is mixed in waste container. Grouting operations should encapsulate the material.
Silica, crystalline – quartz (cement) (14808-60-7)	TLV-0. 05 mg/m^3 (respirable fraction) OSHA PEL (Respirable) TWA 10 $mg/m^3/(\%SiO_2 + 2)$ Quartz (total dust): TWA 30 $mg/m^3/(\%SiO_2 + 2)$	Inhalation and contact hazard	Pulmonary fibrosis and silicosis	Respiratory	ACGIH-A2	Low Material is mixed in waste container. Grouting operations should encapsulate the material . Highest potential is during monolith excavation and sampling.

Table B-3. (continued).

In Situ Grouting Test Pit Simulated Waste or Hazardous Material (CAS #)	Exposure Limit[a] (PEL/TLV)	Routes of Exposure	Symptoms of Over Exposure[b] (Acute and Chronic)	Target Organs and Systems	Carcinogen (Source)[c]	Exposure Potential (regardless of personal protective equipment)
NaCl (7647-14-5)	None established	Inhalation, ingestion, and contact hazard	Eyes and irritation of mucous membranes	None identified—primarily a localized irritant	No	Low Material is mixed in waste container. Grouting operations should encapsulate the material.
$NaNO_3$ (7631-99-4)	None established	Inhalation, ingestion, and contact hazard	Respiratory, eyes, dermis, (inhalation or ingestion may cause cyanosis)	None identified; primarily a localized irritant	No	Low Material is mixed in waste container. Grouting operations should encapsulate the material.
Tb_2O_3	None established	Inhalation, contact hazard, and ingestion	Respiratory irritation, pulmonary fibrosis	Respiratory system	No	Low Tracer compound is distributed throughout simulated waste forms. Grouting operations should encapsulate the material.
Texaco Regal Oil	None established	Contact hazard	Irritation of skin and eyes	Local irritation for contact pathway	No	Low Material is mixed in waste container with absorbent or other material to create sludge-like mixture. Grouting operations should encapsulate the material.

a. American Conference of Governmental Industrial Hygienists (ACGIH) 2001 Threshold Limit Value Booklet and Occupational Safety and Health (OSHA) 29 CFR 1910 substance specific standards.

b. Nervous system: dizziness, nausea, and lightheadedness. Dermis: rashes, itching, and redness. Respiratory: respiratory effects. Eyes: tearing and irritation.

c. If yes, identify agency and appropriate designation (ACGIH A1 or A2, National Institute for Occupational Safety and Health [NIOSH], OSHA, International Agency for Research on Cancer, National Toxicology Program).

VD = vapor density (Air = 1) C = ceiling value CNS = central nervous system CVS = cardiovascular system
GI = gastrointestinal PEL = permissible exposure limit STEL = short term exposure limit TLV = threshold limit value

Material safety data sheets for these chemicals are available at the project site.

Table B-4. Project tasks, associated hazards, and mitigation.

Tasks	Potential Hazards and Hazardous Agents	Hazard Elimination, Isolation, or Mitigation
• Site preparation • Equipment mobilization and demobilization • Equipment operation and evaluation as part of mockup testing • Excavation of simulated waste pit • Re-establishing the simulated waste and pit after excavation. • Inspection, sorting, sizing, and sampling of excavated materials • Material staging, removal, and site restoration	1. **Simulated waste material contact or exposure and other chemicals at the task site**—Direct contact with simulated waste materials (if not encapsulated by grouting operation), contact with grout material (high pH), equipment maintenance or leaks of fuels/lubricants, exposure to dust, and CO and NO_x. 2. **Pinch points, caught-between, struck-by, and overhead hazards**—Equipment assembly and placement, vehicle or equipment movement, RCS and weather structure assembly and disassembly, excavation, simulated waste handling and sizing, and material handling. 3. **Lifting and back strain**—Handling equipment and materials, sorting, sampling, and handling simulated waste materials, and movement. 4. **Tripping hazards, uneven terrain, walking, and working surfaces**—Cold test pit area, wet or muddy surfaces, equipment, cables, and lines on the ground, and inside weather structure. 5. **Hoisting and rigging**—Positioning equipment at project site, forklift operation, and RCS, glovebox, simulated waste pit, and weather structure assembly and disassembly. 6. **Heated surfaces, heat, and cold stress**—Equipment motors and exhaust surfaces, outdoor work, summer, fall, and winter temperatures, and PPE usage. 7. **Hazards noise levels**—Trucks, pumps, drill rig, heavy equipment, compressors, and hand tools. 8. **Energy sources**—High-pressure lines and displacement pump; electrical, mechanical, thermal, and compressed air systems.	1. Establishing work zones to minimize personnel exposure. Using MSDS for all chemicals used. PPE as required to reduce skin contact and exposure to chemicals. Conducting exposure monitoring in accordance with IH determination. Using engineering controls for equipment operation (exhaust and general dilution ventilation). Using water misting to reduce dust creation. PPE (as required). 2. Using qualified operators; using spotter and backup alarms; controlling work zone access; requiring personnel briefing on work area hazards; using body position awareness; donning hand, head, and body PPE as appropriate for activities; and using tag lines as determined necessary for hoisting and rigging activities. 3. Using mechanical lifting and movement devices for heavy or awkward materials. Using proper lifting techniques or two-person lifts (as required) for manual handling. Adjusting the workstation to reduce ergonomic stress. 4. Controlling access to work zones. Identifying and mitigating tripping hazards and marking where possible. Maintaining good housekeeping and keeping walking and working surfaces clean (where feasible). 5. Controlling access to work zones; using qualified operators and certified rigging and following PRD-160, "Hoisting and Rigging," requirements; using tag lines; and imposing wind restrictions. 6. Controlling access to work zones. Identifying and labeling known heated surfaces where contact is possible. Conducting industrial hygiene monitoring and work-rest or warm-up cycles (as required). Donning proper selection of work clothing or PPE. Conducting heat and cold stress personnel training. 7. CWA: conducting industrial hygiene sound-level monitoring and dosimetry for source identification, wearing hearing protection devices. 8. CWA and restricted areas: posting and labeling sources; using tie downs and whip checks; training; isolating energy sources (through lockout/tagout) for all maintenance activities; donning PPE.

CWA = controlled work area IH = industrial hygiene MSDS = material safety data sheet PPE = personal protective equipment

Table B-5. Potential hazardous agents and sampling equipment.

Chemical Hazard to Be Monitored or Sampled	Equipment and Monitoring/Sampling Method [a,b]	
Petroleum hydrocarbons and distillates Nuisance particulates, NOC (respirable) Crystalline silica (respirable) Diesel exhaust	Personal sampling pumps with appropriate media	Petroleum distillate—NIOSH 1550 Particulates, total nuisance (respirable)—NIOSH 0600 Crystalline silica (respirable)—NIOSH 7500 Diesel exhaust—NIOSH 5040
Petroleum hydrocarbons (volatile organic compounds [VOCs])	FID, PID, or equivalent	
CO, NO_2	MSA-361 or equivalent, with CO and NO_2 cells	
Hazardous noise levels (>85 dBA for an 8-hour workday, 83 dBA for a 10-hour day, >140-dBA impact)	ANSI Type S2A sound level meter and ANSI S1.25-1991 dosimeter (A-weighted scale for TWA dosimetry, C-weighted for impact dominant sound environments)	
Heat and cold stress	Heat stress—WBGT, body weight, fluid intake	Cold stress—ambient air temperature, wind chill charts

a. Air sampling will be conducted as deemed appropriate by project IH personnel based on initial direct reading instrument data, operation, and professional judgment.

b. Analytical method will be selected by the IH based on site-specific conditions.

ANSI = American National Standards Institute
dBA = decibel A-weighted
FID = flame ionization detector
NIOSH = National Institute of Occupational Safety and Health
NOC = not otherwise classified
PID = photoionization detector
TWA = time-weighted average
VOC = volatile organic compound
WBGT = wet bulb globe temperature

B-9. PERSONAL PROTECTIVE EQUIPMENT

Cold Test Pit South poses low to moderate potential hazards to all personnel from the ongoing construction, operation, and maintenance activities (Loomis et al. 1997). A description of the levels of personal protective equipment (PPE), upgrading and downgrading criteria, and PPE inspection criteria are specified in Section 9 of the main body of this document. Visitors to the site not requiring access into the exclusion zone will require at a minimum hard hats, safety glasses with side shields, and sturdy leather boots above the ankles. Table B-6 provides the OU 7-10 Glovebox Excavator Method mockup tasks, PPE levels, and PPE upgrade contingencies.

Table B-6. Project task-based personal protective equipment requirements and modifications.

Task	Level of Personal Protective Equipment	Category: Primary or Contingency	Modifications and Comments
All OU 7-10 Glovebox Excavator Method Project Activities			
• Site preparation • Equipment mobilization and demobilization • Equipment operation and evaluation as part of mockup testing	Level D	Primary	Level D PPE as defined in Section 9.2 of the main body of this document. In addition, personnel entering the exclusion zone will wear safety-toed boots. Modifications for specific hand protection for material handling and sampling tasks will be defined by the HSO.
• Excavation of simulated waste pit • Re-establishing the simulated waste and pit after excavation	Modified Level D	Upgrade contingency	Upgrading to modified Level D (protective clothing, Tyvek coveralls or equivalent) may be required if action levels are exceeded or contact with simulated waste material cannot be avoided (prolonged and extensive skin contact).
• Inspection, sorting, sizing, and sampling of excavated materials • Material staging, removal, and site restoration.	Level C	Upgrade contingency	If airborne contaminants increase to concentrations above established action limits, Level C full-face air-purifying respiratory protection will be worn in conjunction with chemical protective clothing (cartridge to be selected by project IH based on airborne hazard).

B-10. DECONTAMINATION PROCEDURES

The OU 7-10 Glovebox Excavator Method Project mockup activities are being conducted at Cold Test Pit South over the ISG test pit (with simulated waste forms) with no hazardous or radiological constituents. Though some of the raw materials used in the simulated waste mixture could present a potential inhalation or skin hazard, the use of engineering and administrative controls should minimize personnel exposure. Therefore, hazardous or radiological decontamination is not required. If simulated waste materials or grout are encountered at levels that present a contact or airborne release hazard to personnel, implementation of additional engineering controls, or some wetting or limited decontamination procedures, may be required to mitigate the potential hazards. In addition, equipment may be cleaned (i.e., decontaminated) at the end of the project using gross mechanical techniques, wiping, or steam cleaning, as required.

B-10.1 Contamination Control and Prevention

If contamination is encountered during Glovebox Excavator Method Project mockup activities, additional wetting or engineering controls will be used to mitigate contact or airborne hazards. Contamination control and prevention procedures will be implemented to minimize personnel contact with contaminated surfaces if such surfaces are encountered and contacted. The following contamination control and prevention measures will be employed if contamination is encountered:

- Identify potential sources of contamination and design containment, isolation, and engineering controls to eliminate or mitigate any potential for contact or release of contaminants
- Limit the number of personnel, equipment, and materials that enter the contaminated area
- Implement immediate decontamination procedures to prevent the spread of contamination (if contamination is found on the outer surfaces of equipment)
- Use only the established control entry and exit point from the contaminated area to minimize the potential for cross-contamination and expedite contamination control surveys
- Wear disposable outer garments and use disposable equipment (where possible).

B-10.2 Personnel and Equipment Decontamination

Decontamination procedures for personnel and equipment during Glovebox Excavator Method Project mockup activities are not anticipated to be required beyond normal PPE changeout and equipment cleaning, respectively. If waste contact cannot be avoided (e.g., excessive contact from prolonged periods that may cause skin irritation or drying or dermatitis), then additional engineering controls, in combination with PPE upgrades, may be necessary to control the contact hazard. Equipment will be decontaminated based on the source of contamination.

B-10.3 Modified Level D Personal Protective Equipment Doffing and Decontamination (if required)

If required to be worn during Glovebox Excavator Method Project mockup activities, modified Level D (see Section 9 of the main body of this document) protective clothing (e.g., disposable coveralls) will be doffed following standard removal techniques (rolling outside surface inward and down) and will constitute the initial decontamination step. All PPE will be placed in the appropriately labeled containers.

Cloth coveralls may be reused as long as they remain serviceable, according to an industrial hygienist and safety professional judgment call.

B-10.4 Level C Personal Protective Equipment Doffing and Decontamination (if required)

If respiratory protection is worn during Glovebox Excavator Method Project mockup activities in conjunction with protective clothing (e.g., Level C PPE [see Section 9 of the main body of this document]), then the modified Level D sequence will be followed with one additional step. For that additional step (following protective clothing doffing), respirators will be removed and placed in a separate container.

B-10.5 Site Sanitation and Waste Minimization

During Glovebox Excavator Method Project mockup activities, site personnel will use the portable toilet facilities provided in the Cold Test Pit South or restroom facilities inside the RWMC area. Potable water and soap, or hand and face sanitary wipes, will be available within the administrative trailer or the RWMC facility for personnel to wash their hands and face upon exiting the work area.

Waste materials will not be allowed to accumulate at the project task sites. Appropriately labeled containers for industrial waste and CERCLA waste will be maintained at the project site. Personnel should make every attempt to minimize waste through the judicious use of consumable materials. All site personnel are expected to make good housekeeping a priority at the job site.

B-11. EMERGENCY RESPONSE PLAN FOR COLD TEST PIT SOUTH

Section 11 of the main body of this document defines the responsibilities of personnel working at the cold test pits (including Cold Test Pit South) and the INEEL Emergency Response Organization by providing an emergency response plan for guidance in responding to abnormal events during activities at the pits. Section 11 of the main body of this document is applicable to the OU 7-10 Glovebox Excavator Method mockup activities and will be implemented as applicable.

B-12 REFERENCES

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